

MOTOR AGE

Vol. XXXIII
No. 15

CHICAGO, APRIL 11, 1918

Ten cents a copy
Three dollars a year

Now, Automobile Dealers— Here's a New Angle!

Your best mechanics have gone into the military service.

Your repair force is all shot. Have you thought how you are going to do all the repair work that is coming to you this year in addition to keeping up the service on the new cars you sell?

It's a big problem. More than one dealer has worried over its possibilities.

The worry is greatest among those who sell cars that call for a great deal of service attention to keep them running.

Naturally, the easiest way out of such an inevitable difficulty is to sell cars that don't call for such service.

Buyers much prefer cars that seldom have to go into the service station. They would rather have such a car than to have any car that needs such attention no matter how inexpensive and how easily obtained such service might be.

The 50,000 Hudson Super-Sixes in service and the records that Hudsons have made are the proofs of its endurance.

The Super-Six was built from the first to be one that would call for the minimum amount of service attention. Every car built has shown us ways by which the endurance of later cars could be lengthened. The present series express the attainment of an ideal in endurance we never dreamed possible when the first Super-Six was put out. And you who have watched the performance of automobiles know how much superior in the matter of endurance even the first Super-Sixes were to other cars, regardless of their selling price.

There is a remote possibility that you are in business in a territory not now represented by Hudson. Or perhaps you are the very dealer we have had our eyes on for some time. At any rate, why not write us if you are interested? Even if nothing comes of it, it won't do any harm for us to get acquainted with each other. You and we are going to be in business for a long time. Who knows what might result from a note from you that you are interested!



Hudson Motor Car Company
Detroit, Michigan

SAVES GASOLINE



CONSERVATION is the word of the hour. Even though economy of gasoline may not be interesting to you personally, still you should conserve from a patriotic point of view. Clean cylinders reduce the gas and oil consumption 12% to 25% and give you the maximum power and speed from the minimum amount of fuel. That knocking in your engine—the difficulty of climbing hills—poor pick-up—lack of power—noisy motor—pre-ignition—in fact, 80% of engine trouble is caused by carbon. Clean it out with

JOHNSON'S CARBON REMOVER

and your engine will run as it did the first 500 miles—quietly and full of "pep". Johnson's Carbon Remover will save you from \$3.00 to \$5.00 over any other method, without laying up your car and with much better results. No time or labor required—you can do it yourself in five minutes.

Use It Every 1,000 Miles

If you will use Johnson's Carbon Remover every 1,000 miles or oftener, giving carbon no chance to accumulate, you will automatically eliminate most valve trouble and your engine will always be clean and sweet and at its highest efficiency.

For All Gas Engines

Gasoline Engines of all kinds should be given an occasional dose of Johnson's Carbon Remover—the engine laxative. It will increase the efficiency of automobiles—trucks—tractors—motor-cycles—motor boats—and aeroplanes.

S. C. JOHNSON & SON, Dept.

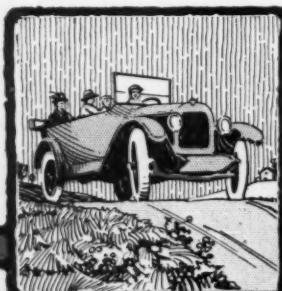
MA. RACINE, WIS.

A Harmless Liquid

Johnson's Carbon Remover is perfectly harmless. It contains no acids and does not affect lubrication or interfere with the oil in the crank case. Has no action on any metal. Over three million cans used with entire satisfaction.

Keep Your Car Young

We publish an attractive little booklet entitled "Keep Your Car Young." This is full of valuable information to every man who owns or drives an automobile. We shall be glad to send it to you free and postpaid.



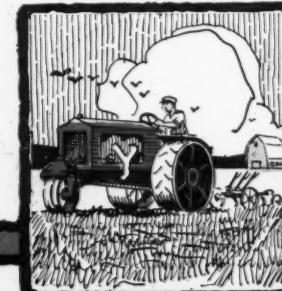
For Pleasure Cars



For Delivery Cars



For Trucks



For Tractors

MOTOR AGE

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NEXT WEEK

Among the features of MOTOR AGE for next week will be extracts from the great war meeting which the United States Chamber of Commerce is holding in Chicago this week.

ORDER
DUTCH BRAND
PRODUCTS
TODAY



Don't Risk
Running Short
at the Height
of the
Season

**STOCK
NOW**

Place your
order NOW
for future
shipment

Railroads take weeks now where formerly they took days. Allow for this extra time as well as for the great rush in our factory.

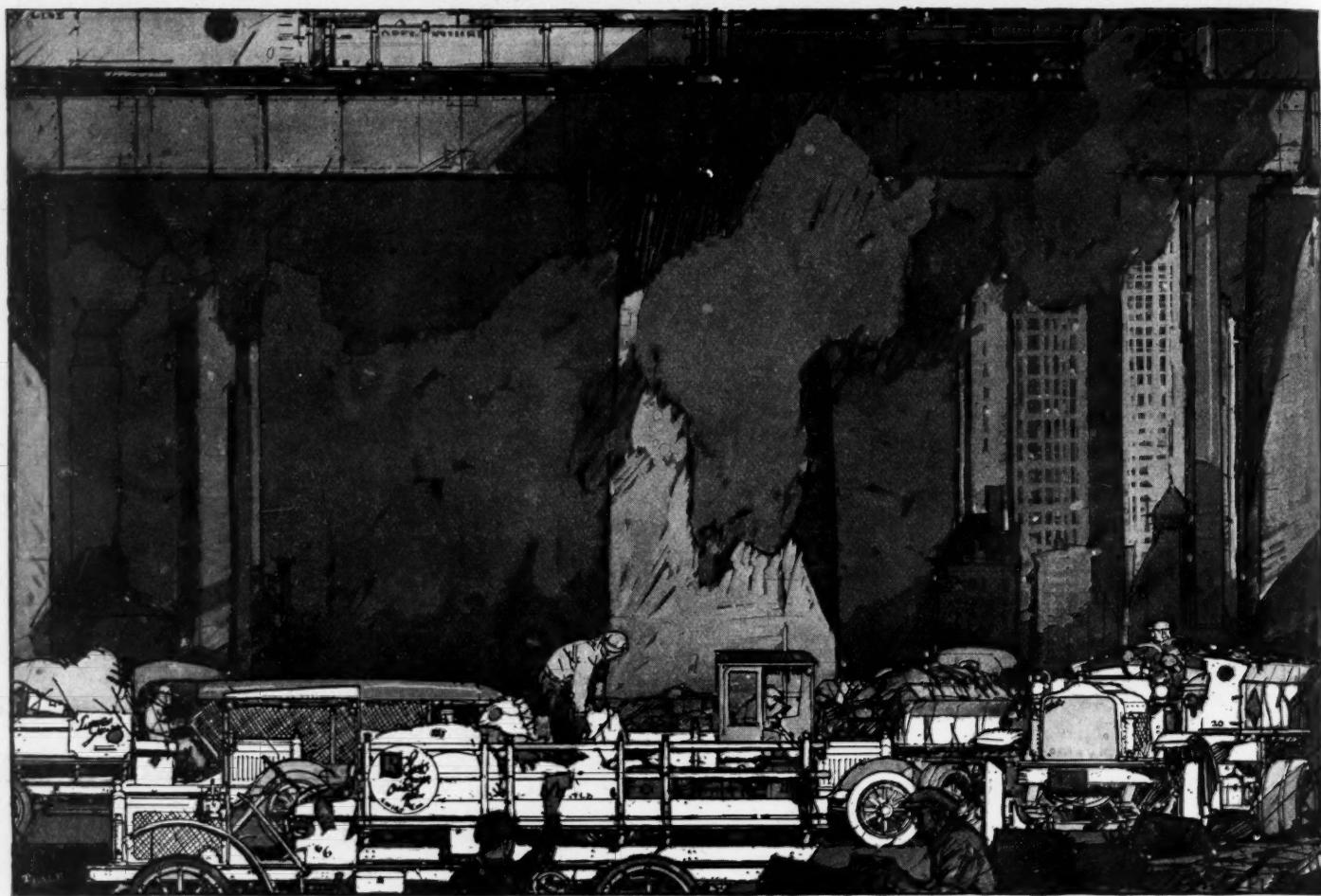
We are fairly buried in orders now and nearly everybody says "rush"

DUTCH BRAND PRODUCTS

2-in-1 Tread Filler, a liquid rubber, quickly closes causing bruises; Radiator-Seal instantly stops radiator leaks; Auto Patching Cement insures a patch that will stick and stay stuck; Rubber-Seal permanently heals large cuts and gashes in casings and tubes; Vulcanizing Cement for use with small portable vulcanizers, or for shop use; Carbo-Cide, a carbon solvent of unsurpassed merit; also Valve Grinding Compound, Auto Top and Cushion Coating, Gasket Shellac, Varni-Brite, and Auto Polish, Tire Tale and Friction Tape.

CAR USERS: Order of your dealer.
DEALERS: Stock through your jobber.

VAN CLEEF BROS., 7711 Woodlawn Ave., Chicago



Delivery Costs in this Country Equal its Total Freight Bill

AUTHORITIES estimate that the American people pay as much for carting and delivering merchandise in towns and cities as they do for freight charges earned by all the railroads combined. This is a tremendous factor in the high cost of living.

Cartage from freight car to store door is an expensive item. There is no schedule about it. Consignees go for their freight whenever they get ready and often spend hours in getting it, due to congestion, and then carry away only part of a load.

CONSUMER PAYS OVER SIX CENTS OUT OF EVERY \$1

An interesting investigation has been made recently by the Department of Commerce to determine the cost of retail delivery in the city of Washington. Figures obtained from 128 concerns doing one-third of the total retail business showed an average delivery cost of 6.2% of gross sales. Out of every dollar spent for merchandise *more than six cents was paid for delivering it.*

The actual cost, in different lines of business, ranged from 1½% to 45%. It totaled \$8,000,000, as against \$7,250,000 for inbound freight. Each

family in Washington thus paid on an average \$101.26 for retail delivery during the year 1916.

A SIGNIFICANT FEATURE

Costs varied widely for concerns in the same line of business. While individual conditions, volume of trade, etc., were factors, *inefficiency and waste* played a large part in this variation. Some concerns used horses for delivery; others used inferior trucks; and still others, including some of the foremost and largest concerns, used the *best grade* of trucks, whose operating efficiency is high and whose operating cost is correspondingly low.

THE REAL SOLUTION

War-time pressure now and peace competition after the war will inevitably force merchants and manufacturers to use the best trucks which can be built. They are the cheapest. True economy lies in the volume of performance steadily maintained over a long period of time. The investment charge is relatively small. Labor, fuel, depreciation, overshadow it. Any increase of the former which will decrease the latter effects a very substantial saving.

THE WHITE COMPANY CLEVELAND

When Writing to Advertisers, Please Mention Motor Age

MOTOR AGE



The first carload of the 1000 tractors purchased by Michigan arrived at Lansing April 5, and distribution began

Michigan Launches Her 1000 Tractors

THE first carload of the 1000 tractors which the War Preparedness Board of Michigan bought from Henry Ford & Son, Dearborn, Mich., for distribution to the farmers of the state, arrived at Lansing, Mich., Friday, April 5. By late afternoon of the same day six happy farmers were chugging their way forward with the intention of putting their new possessions immediately to work. The first tractor unloaded was commandeered promptly by Harold E. Neller, son of G. Neller, R. F. D. 4, Lansing, and in a few moments was traveling around the railroad yards on high. Creyts Brothers, G. D. McKim, H. E. Saire and S. A. Foster, all farmers near Lansing, in succession claimed the next four as they were run down from the car. Not a man in the bunch but was as tickled as a boy

By Fred M. Loomis
Motor Age Editorial Staff

with a new top. Evidently, too, little instruction will be required by any of them, as every tractor moved off as if in the hands of a master.

Half Ordered Early

The next day deliveries were made at Mason, Stockbridge and Owosso, and within a few days practically the entire 1000 will be busily at work in the fields of the state. Up to the close of last week the War Preparedness Board had received signed orders for nearly half of the tractors bought, and the bank balance of the board had been swelled by nearly \$75,000 in advance payments.

The enthusiasm which the state distribution of tractors is meeting in Michigan is indicative of what likely would happen in any other state of the Union in which a similar project should be undertaken. Nevertheless, should it be tried again, the details of distribution might be worked out a little more fully than was the case at Lansing. For instance, no arrangements had been made for unloading, and considerable uncertainty existed until the last minute as to just where this would take place. No men skilled in the work of handling heavy farm equipment were on the job. No arrangements had been made for an available supply of oil, gasoline or water. Every farmer was compelled to scurry around on his own initiative and rustle fuel and oil for himself. It would have been



Though there was no hurrah about the reception of the tractors, it was important

the easy and obvious thing to have had a tank wagon on the spot with supplies of these essentials, but apparently no one had thought of it. A little preparedness of this kind would have prevented delay and confusion.

In addition, as far as is at present known, no arrangements have been made at any of the points of distribution in Michigan to make an event of the delivery. So important an occasion as the delivery of one or more cars of tractors to a single small community of farmers deserves some publicity and a little hurrah. However, considering that this is the first attempt of such magnitude, some blindness as to detail may be forgiven. Subsequent events of the kind easily might be managed more conveniently and expeditiously.

However critically disposed one may feel toward the manner in which the Michigan distribution is being handled, there still are things about it which lend interest and importance to such an event as the distribution of 1000 tractors to the farmers of a single state within the short space of one month.

Concentration of Power

First, perhaps, comes the concentration of agricultural productive power. It has been proven conclusively that the use of a tractor in tillage operations increases materially the productive capacity of the farm. Of course, 1000 tractors put to work anywhere, collectively or individually, would have the same effect upon production, but where so many tractors are started almost simultaneously within a limited area the result is far more apparent than would be the case were the machines scattered. Michigan heretofore has not ranked as one of the principal tractor-using states. During April, however, her quota of tractors in actual use will have been increased by 1000, thus putting her at once into the front ranks and making the increase in her agricultural production for this and subsequent years a factor of great importance.

Under the stimulus of the enthusiasm

engendered by an experiment of such magnitude these 1000 tractors will reach more quickly the places where they can be used advantageously than would be the case were their acquisition left to the normal course of trade. Tractor ownership will have been speeded up and farmers who should have tractors will be induced by the urge of the occasion to come to a buying decision whereas otherwise they would have been more deliberate about it. Probably as many tractor sales will have been effected in one month as would have been effected in a year of normal buying. This also is of great importance.

Every farmer who buys one of these tractors signs an agreement to keep his tractor in use the greatest possible amount of time and to lend it at a reasonable price for use in the fields of his non-tractor owning neighbors whenever it can be spared from his own fields. Such neighborly employment, to be sure, is entirely dependent upon the volition of the man who owns the tractor, since no steps have been taken, nor can any be taken, to enforce community use. It is likely the fact, too, that a majority of the purchasers will find they will have little time to devote to their neighbors this spring, since most of the machines will go onto farms where there will be use for them to the limit of their capacity during the spring plowing season. Nevertheless there doubtless will be numerous instances of neighborly assistance, and thus the idea of community use of farm power equipment will be fostered. This cannot fail to be an advantageous and important development.

Co-operation of national, state and individual effort for a common purpose also comes about through the working together of county agricultural agents, directly connected with the United States Department of Agriculture, the chairmen of local War Preparedness Boards, reporting to the state War Preparedness Board at Lansing, and the local retail implement dealers at points of distribution. The county agents and the local chairmen get the orders for trac-

tors from the farmers, make up the carload shipping directions and attend to the delivery of the tractors and the collection of the purchase price. The retail implement dealer, because of the insistence of the Oliver Chilled Plow Works, will be the instrument for the coincident distribution of the Oliver tractor gang plow which has been designed for use with the Fordson tractor and which in a majority of instances will go into the fields with it. The demonstration of the fact that all these factors can work together harmoniously and effectively for a common purpose is a notably important achievement in itself.

Collectively the distribution of tractors and plows in Michigan is the biggest thing of the kind ever undertaken in the history of American agriculture and has a significance and importance tremendous in its import. It has furnished the occasion for manufacturing industry, national and state officials and individual interests to demonstrate their patriotic impulses with a spontaneity and with a singleness of purpose never before witnessed. It furnished the opportunity for a manufacturing wizard to put his genius for factory organization and production to the service of his country at a time of imminent emergency. It demonstrated the ability of state officials to show their appreciation of an opportunity and their initiative in rising to its importance. It gave another manufacturing concern the chance to demonstrate its loyalty to its dealer organization without derogation to its own patriotism. These all are things of more than ordinary interest and importance.

Start of Idea

When Henry Ford & Son had reached the point where the Fordson tractor was both a dependable machine and a commercial possibility the idea occurred to Mr. Ford that his output could be used most advantageously by an immediate concentration of distributive effort and by insistence upon the tractors going only into such localities as might use them for this year's crop. Naturally his thoughts turned first to his own state, and, in pursuance of this idea, he proposed to Governor Sleeper of Michigan that the state undertake the purchase and distribution of 1000 tractors and plows. This appealed strongly to the governor and to gain such assistance as was possible from the patriotism of the people the project was undertaken through the state War Preparedness Board of which Governor Sleeper is ex-officio chairman and of which Maj. Roy C. Van der Cook is secretary. The co-operation of the newspapers of the state was obtained and the proposition was put up to the farmers. The response was instantaneous and enthusiastic. So many applications for tractors poured in upon the War Preparedness Board at Lansing that the success of the experiment was assured from the start. Henry Ford & Son were instructed to go ahead with the production of the machines and to make the entire delivery during April.

The Fordson tractors are being sold direct to the farmers by the state at a uniform spot cash price of \$750 f.o.b. Dearborn. Orders are being taken and tractors are being distributed by county agricultural agents and by chairmen of local War

Preparedness Boards. These officials look also after the collection of the purchase price, which ultimately reaches Henry Ford & Son through the central War Preparedness Board at Lansing. The Oliver tractor plows which complete the equipment are being distributed through the local retail implement dealers at points of tractor distribution, at a uniform spot cash price of \$125, delivered.

An important feature of the plan, one which appealed strongly to both Mr. Ford and to Governor Sleeper, was the community co-operation idea. The order which the farmer signs for his tractor, binds him to lend his tractor at a reasonable price for the benefit of his neighbors whenever he can spare it from his own needs. This obligation which the farmer assumes is more moral than legal in its force, it must be admitted, since it will be impossible to enforce it, but it will have force nevertheless. Compliance with it will be increased by the activities of the officials who have charge of the distribution of the tractors, since they will interest themselves to the extent of watching for opportunity to keep the machines constantly in use. Without any doubt many more acres will feel the good effects of tractor tillage through this provision in the contract than otherwise would have been the case. Thus in a measure at least this ideal of community use will have been attained.

There is a report that disagreement exists between Henry Ford & Son and the Oliver Chilled Plow Works on the one hand and Governor Sleeper and the War Preparedness Board on the other, regarding the manner of distribution and the price of the Oliver tractor plow which is to be used in connection with the tractors. Whatever disagreement existed at any time was due entirely to a misunderstanding upon the part of Henry Ford, but it never reached a really serious stage. A compromise was effected easily, and although it is true that some modification of the original plan of plow distribution and price was made, the distribution of plows and tractors now is going ahead on parallel lines and all in-

volved are working in harmonious conjunction.

The Oliver No. 7 tractor two-bottom gang plow was designed originally for use with the Ford tractor in England and Canada. Several thousand of them have been shipped abroad, and 1000 are going into Canada. Inasmuch as the Oliver company had no dealer organization to protect in England and all service responsibility ceased as soon as the plows were delivered to the transportation company at South Bend, Ind., the Oliver company made a price to the English government of \$97.50, f.o.b. South Bend. The same price and terms applied to the Canadian consignment.

When Henry Ford made his proposition to Governor Sleeper he knew of the English and Canadian deals and, without consultation with the Oliver Chilled Plow Works, jumped to the conclusion that he could duplicate the deal, and the original proposition contemplated the delivery of the tractor and plow at a uniform price of \$850. Mr. Ford was unauthorized to make this price and as soon as the terms of his joint proposition came to the attention of the Oliver Chilled Plow Works Governor Sleeper was advised immediately that the company could not meet the conditions. This threatened for a time to stall the whole deal, but the Oliver company made a compromise proposition finally which the governor accepted.

Shipped to Dealers

This was to the effect that the Oliver plows should not accompany the tractors from the Ford factory but that they should be shipped from South Bend directly to retail implement dealers at the points where the tractors were to be distributed. According to the original sales plan on this special plow worked out by the Oliver Chilled Plow Works it was to have been sold to the dealer at \$125. As a protection to their dealer organization in Michigan, where they have some 600 agents, the Oliver Chilled Plow Works insisted that no lower price would be considered nor sanctioned. However, as a special concession

in the Michigan deal and as a compromise proposition to the governor, the company agreed that the price to the farmer on these 1000 plows might be the dealer price of \$125, and a special discount of 12½ per cent would be given to the dealer and the freight allowed. Settlement in cash at the time of delivery was insisted upon by the company so that the dealer should incur no credit risk. All responsibility for and expense of expert service was assumed by the company. This proposition was acceptable to the governor, and the Oliver plows now are being delivered in accordance.

The Oliver No. 7 two-bottom gang plow is especially designed for use with the Fordson tractor and is described on page 42 of this issue. It marks a notable advance in engine plow design and construction. By the use of a heat-treated alloy steel the weight of the plow has been reduced 25 per cent below that of any engine gang of similar capacity on the market. It is also exceedingly simple in construction and easy of operation. The lifting device and the depth regulating feature are new and effective. By an arrangement of the plow levers these are brought within easy reach of the tractor operator, making the outfit strictly a one-man unit.

It is predicted that through the development of the Fordson tractor and its companion, the No. 7 Oliver two-bottom engine gang, the way has been opened for a revolution in American agricultural methods within the next few years. A completely effective combination unit has been worked out which brings the advantages of power farming within the reach of the farmers of moderate means and farmers who work a quarter section or less. The Fordson tractor and the No. 7 Oliver plow can be made an economical proposition on farms of average size, which heretofore could make only exceptional use of a tractor and tractor equipment. The coincident development of these machines marks the beginning of a new era in agriculture, and the first big demonstration is being pulled off in Michigan.

POSTAL LANDING SITES

Washington, April 9—Special telegram—The three landing places for aerial mail service between Washington and New York have been selected. The fields are being prepared and hangars erected. The service will be in operation not later than May 15, and possibly sooner. The three landing fields selected are Potomac Park, Washington; Bustleton, Philadelphia; Belmont Park, New York. The hangars at Potomac Park are in course of construction, and soon those at Bustleton and Belmont Park will be started. Extensive rolling and grading of the Philadelphia field will be done.

Assuming that the airplanes leave New York at noon for Washington and leave at the same hour from Washington for New York, rail connection for destinations beyond those cities and Philadelphia which otherwise would be impossible, will be made. In addition to saving much time in the delivery of letters addressed to New York, Philadelphia and Washington, there will be considerable time saved through making these connections for earlier trains beyond the terminals. An airplane

leaving New York at 12 o'clock noon, arriving at Philadelphia at 1:30 and at Washington at 3:30 will make connection with trains several hours earlier than present connections for many cities in New Jersey, Pennsylvania, Delaware and Maryland. At the same time the mail reaching Washington at 3:30 will make connection with numerous trains leaving Washington at 4 o'clock for many points in the South.

The airplanes from Washington on the noon schedule will arrive at New York at 3:30, and their mail will be delivered in New York in the late afternoon city delivery. To make this delivery by train, letters now have to be mailed at the railroad terminal in Washington before 9 a.m.

MAXWELL TO BE ON BOARD

Washington, April 9—Special telegram—J. D. Maxwell, formerly head of the original Maxwell Motor Co. and for several years living in retirement at Tarrytown, N. Y., soon will enter into active motor car work again as a member of the automotive products section of the War Industries Board.

LIMIT TO TRUCK WEIGHT

New York City, April 9—Special telegram—The teeth of the Hewitt Highway protective measure have been extracted. As originally introduced the measure would have barred from New York state highways all commercial vehicles which with their loads weighed in excess of 10 tons. Following protests by members of the National Automobile Chamber of Commerce dealers all over the state and Motor Truck club, Senator Hewitt and the highway department have agreed to raise the limit to 25,000 lb. The amended bill is to be introduced to-day and in all probability will pass. This limit means that the bill no longer has the sting which it had. In other words it will not bar 5-ton trucks fully loaded, which apparently was the original intention.

INVESTIGATE PETROLEUM PRICE

Washington, April 9—Special telegram—The Interstate Commerce Commission has ordered an investigation to learn why petroleum and petroleum products vary in price in different localities.

Report Commends Liberty Engines

Red Tape Blamed by Snowden Marshall Committee for Delays in Production

WASHINGTON, April 5—While the complete report of the Snowden Marshall investigating committee appointed by President Wilson to report on the airplane situation is not available it is understood to contain recommendations which will eliminate the red tape which has been largely responsible for the deplorable conditions in aircraft production today. The committee has made a complete circuit of the airplane factories, and its report is ready.

The report shows that airplanes are being turned out in satisfactory quantities, and there are indications that production soon will meet all public expectation. The Liberty engine is upheld as a complete success in the field for which it was designed. The report will tell how Great Britain is eager for Liberty engines, and so great is this eagerness that arrangements are being made to export the parts and have them assembled in England.

The report will show that the parties responsible for the failure to date in the aviation program were largely interfered with by Government red tape and will recommend a simplified system of production which will eliminate official interference and suggest the creation or placing of greater power in the hands of the civilian heads of the airplane program.

Pleased with Work

It appears that as a result of Mr. Marshall's visits at the airplane factories he was amazingly pleased with what has been accomplished in the different factories visited. It is understood he visited Wright-Martin, Curtiss, Packard, Cadillac, General Motors, Lincoln Motors, Marmon, Dayton-Wright, Ford and Fisher and several other plants.

As a result of this investigation, the report not only praises the Liberty engine design but also praises the tooling up for its production in the factories, as well as the general factory equipment for production of aviation engines, which has never been accomplished in any country before this time.

Not only does the report approve of the present arrangements in all the factories for the production of Liberty engines, but it also approves of what has been done in the production of other types of engines up to the present time.

The Marshall committee is of the opinion that there is no necessity for an air ministry or an air board such as used in England and France but believes that for the present the civilian aircraft board can accomplish all that is desired, provided it is not hampered too much by red tape. At present this civilian aircraft board can only make recommendations and cannot take action without the approval of the officers of the Signal Corps and the War Department. It seems to be this red tape that has so seriously interfered with airplane production to date.

As a result of the investigation the re-

port is current here that steps have already been taken to abolish the red tape which up to this time has tied the hands of manufacturers engaged in aviation work. It is believed that good results already have followed.

What disposition President Wilson will make of the Marshall report is not known, but it is possible that a special report containing the recommendations of the committee will be issued by him, and such should have a very reassuring effect on the country.

Just at the time this report is coming out rumors of difficulties in connection with aircraft work are current. It is known that the production of planes has been delayed because of wing beams, that is, the large piece of wood which forms the main support of the wing. This shortage has been due to superinspection, in that Government inspectors have refused to pass much material for these wing beams which would have proved entirely satisfactory.

This spruce for these wing beams was approved by Government inspectors in the spruce forests of the West, but when it arrived at the airplane factories east of the Mississippi it was rejected by other Government inspectors. In some of the airplane factories this rejected material has been carefully stored in special buildings erected for this purpose, and the manufacturers feel confident that within a month this material, which is entirely satisfactory, will be passed by the Government inspectors at these factories. Should it not be passed by these Government inspectors, the production of planes will continue to be greatly hampered as it has been in the last month.

There have been many other delays in the shipment of materials, which delays cannot be laid to the manufacturers but rather to Government officials. There have been consignments of spruce which, while explicitly ordered to be shipped to certain factories from the spruce regions of the West, have been shipped to other factories. On reaching these other factories there have been long delays in order to get reshipment made, so that a month to six weeks' precious time has been wasted by this carelessness, which has not in any wise been due to the manufacturer.

FOUR COLUMBUS TRUCK ROUTES

Columbus, Ohio, April 5.—Two concerns are now operating freight transportation lines by motor trucks out of Columbus, both with considerable success. J. F. Dewey, a motor truck agent started three routes some time ago. He makes two trips each week each route, which average seventy-five miles in length. A 6-ton truck and a 1½-ton truck are used.

One route runs from Columbus to Lancaster, thence west to Circleville and back to Columbus, taking in many intermediate

towns. Another route runs from Columbus to Newark and return over different roads. The other runs to Marysville, thence to Delaware and back to Columbus.

Ivan A. Horton has established a motor freight route from Columbus to Toledo. The route leads through Worthington, Delaware, Prospect, Marion, Upper Sandusky, Fostoria, Bradner, Pemberville and Toledo.

10,000 1918 CLEVELAND TRACTORS

Cleveland, Ohio, April 8—The Cleveland Tractor Co. anticipates a production of 10,000 tractors during the present year. The first Cleveland tractor was produced in the fall of 1916, and in January, 1917, it began the manufacture of them in a building 60 by 250 ft. An addition, 60 by 300 ft. was erected during 1917; a new factory building, 60 by 460 ft., a boiler and hardening room, 80 by 90 ft., and an annex to this of 90 by 200 ft. were also built. The company made 1032 tractors from April to Dec. 31, 1917.

TO TRAIN SOLDIERS

Kansas City, Mo., April 5—H. J. Rahe and E. J. Sweeney, proprietors of the two large automotive training schools in Kansas City, received this week the first contingent of National Army men who are to receive special training in their schools. Those who come to Mr. Sweeney's school probably will be cared for in his own building both as to instruction and residence. The Rahe contingent will be given instruction in the Rumely building, North Kansas City, Mo., which has been leased for the purpose. This is a five-story building 130 by 380 ft., where 2000 students can be accommodated. The Rumely building is in North Kansas City near the field where the Rahe school gives outdoor practice on tractors to its students. The Rahe school will provide recreation grounds for the National Army men, with possibly a beach at the Missouri river, a short distance from the Rumely building.

GOODYEAR EXPANDS TRUCKING

Cleveland, Ohio, April 6—The first step in the development of the plan of the Goodyear Tire & Rubber Co., Akron, Ohio, to ship all its products east of the Mississippi river by motor trucks will be made April 10, when four 3½-ton solid-tired trucks will leave Akron with a shipment of tires for the Newark, N. J., branch of the Goodyear company. It is expected the trucks will make the 500-mile trip in slightly under four days and that they will bring back crude rubber to the Akron plant.

These trucks have been hired especially for the purpose and are distinct from the fleet of seven Goodyear pneumatic-tired trucks which the company has been operating between Akron and Boston for some time. The introduction of the solid-tired trucks marks the first step in the proposed plan of the Goodyear company to ship all its goods to the eastern seaboard and as far west as the Mississippi river by motor trucks. It is intended later to employ other trucks to carry tires from Akron to Cincinnati, where they will be loaded

on the Mississippi river boats for distribution in the South.

The trucks are 3½-ton Packards owned by the Cleveland, Akron & Canton Transfer Co., Akron, Ohio. The same company has been operating a fleet of twenty-one trucks in overland haulage throughout Ohio since May, 1917. The trucks will be under the supervision of C. H. Smith, superintendent of the company, who plans to make the trip over the Lincoln Highway route in 50 hr. The trucks will leave Akron at dawn April 10 and will be driven 16 hr. a day.

PARRETT TRACTOR REORGANIZES

New York, April 8—The Parrett Tractor Co. of Delaware has been organized with a capital of \$3,000,000 fully paid in and has acquired the assets and plant of the Parrett Tractor Co. of Illinois, which has been producing farm tractors since 1912. Among the principal movers of the plant, which is at fifty tractors a day and proposes to build 5000 this year, are Claire L. Barnes, for several years personal representative of John N. Willys, and Vincent Bendix, inventor of the Bendix drive for electric starters.

Dent Parrett is president of the new company and with him are: Vice-president and general manager, Claire L. Barnes; vice-president, Robert Barbour, also chairman of the board of directors; secretary, Warren Barbour; treasurer, Arthur Gardner; works manager, Robert C. Webster.

The Parrett plant at Chicago Heights, Ill., has a capacity from 7500 to 10,000 tractors a year. Over 200 tractors were shipped in March.

OVERLAND PRICE INCREASES

Toledo, Ohio, April 5.—Willys-Overland increased the prices of both passenger cars and trucks from \$35 to \$100. The new prices follow:

Model 90	New Price	Old Price
Touring	\$ 850	\$ 795
Roadster	835	780
Country Club	875	840
Sedan	1,340	1,240
Chassis	800	710

Model 85 B-4	New Price	Old Price
Touring	\$ 985	\$ 930
Roadster	965	915
Sedan	1,485	1,485
Coupe	1,285	1,285
Chassis	880	845

Model 85 B-6	New Price	Old Price
Touring	\$1,195	\$1,130
Roadster	1,195	1,115
Sedan	1,620	1,620
Coupe	1,420	1,420
Chassis	1,110	1,045

Model 88-4 (Knight)	New Price	Old Price
Touring	\$1,625	\$1,525
Sedan	2,325	2,225
Coupe	2,275	2,175
Limousine	2,425	2,325
Chassis	1,475	1,375

Model 88 (Knight)	New Price	Old Price
Touring	\$2,100	\$2,000
Varsity	2,550	2,550
Sedan	2,800	2,700
Coupe	2,675	2,675
Limousine	2,900	2,800
Town Car	2,900	2,800
Chassis	1,950	1,850

Model 89 (Willys Six)	New Price	Old Price
Touring	\$1,450	\$1,365
Club Roadster	1,450	1,365
Sedan	1,330	1,245

Commercial Cars	New Price	Old Price
Model 90 Express	\$ 840	\$ 785
Model 90 Panel	865	810
1200-lb. Chassis	915	880
1200-lb. Express	975	930

English Must Decide Between Fuels

Further Curtailment Confines Car Owner to Coal Gas or Gasoline Alone

London, Feb. 9—Further curtailment of the use of coal gas for motor cars and trucks is contained in a new order issued to-day. Jan. 15 the use of gas for cars and trucks was limited to those cases where it is legal to use gasoline as a motor fuel. Now no form of gas may be used without a permit from the Government, and the motorist must decide whether he will use coal gas or gasoline as a fuel.

If a car was fitted with gas apparatus prior to Jan. 3, 1918, a gas permit will be issued subject to conditions. If a car is not so equipped the application will be considered on its merits and gas permits issued only in the same cases where a gasoline license would be granted. Both kinds of permits will not be granted to the same car.

Owners of commercial vehicles may obtain gas permits in the same instances where gasoline licenses would be allowed, but both permits will not be allowed in the same vehicle subject to exception that every commercial vehicle holding gas permits will be allowed not to exceed 4 gal. of gasoline a month for emergency. Owners of omnibuses must give provisional estimates of monthly mileage on gas and gasoline, respectively, and gas permits will be granted, provided the gasoline quantity license will be reduced proportionately with the mileage run on gas.

Owners of commercial vehicles seeking gas permits must provisionally surrender a third of their present allowance of gasoline. Owners of both omnibuses and trucks must furnish a monthly statement of the mileage run on gas and petrol, and the reduction of the petrol quantity license will be adjusted accordingly. It is not proposed to make any reduction of the existing allowance of gasoline in respect to mileage run on gas prior to Jan. 3. A gas permit will not confer the right to demand a supply of gas but allows it when it is available. There is at present no restriction on the amount that may be used.

AMERICAN TOURING CAR LESS

New York, April 5—The American Motors Corp. has decreased the price on its five-passenger touring car from \$1,695 to \$1,595, effective April 1.

The company is to issue \$100,000 in treasury notes. Robert Bursner has been elected president, with Louis Chevrolet again vice-president and chief engineer; George W. Cravens, general manager; and Proctor W. Hansl, secretary-treasurer. The litigation between the company and the Martin Carriage Works, York, Pa., has been settled amicably and all suits by both sides have been withdrawn. The Martin works will continue to build the bodies for the American Motors Corp.

ENTER "REQUIREMENTS DIVISION"

Washington, April 5.—Bernard Barush, chairman of the War Industries Board, has inaugurated a requirements division to act

as a supreme coördinating board and eliminate competition between Government departments and establish non-conflicting priority. Alexander Legge has been named chairman and James Inglish, secretary. Judge E. B. Parker, George N. Peek and J. L. Beplogle, all members of the Council of National Defense, complete the board.

The exact aim of this new division is to prevent conflict of priority such as happened last winter when the Shipping Board, Aircraft Board, Ordnance, Quartermaster and other divisions each demanded priorities, both for transportation and materials with the result that everybody had priorities.

YORK SELLS MORE CARS

York, Pa., April 7—While the war and other general conditions seriously affected the third annual exhibition of the York County Automobile Dealers' Association during the last week, exhibitors feel that the show as an advertising proposition surpassed all previous exhibits in this city. Not only were as many prospects secured, but the number of car sales also exceeded those of last year. The attendance, however, was considerably below last year.

The exhibits of the twenty-three dealers, manufacturers and accessory men completely filled all the 40,000 sq. ft. of floor space in the tabernacle, the amount of space given to exhibits being the same as last year. The display of trucks was a feature of the show this year. About 15 per cent of the floor space was devoted to trucks, and fifteen different makes were on display. One hundred and seventy-five cars representing fifty different makes were included in the display.

Owing to the seriousness of the fuel situation the show was postponed from Feb. 2. An exhibit of Cleveland creeping tractors by the Harrisburg Auto Co., was a feature and attracted the attention of the show visitors. The Harrisburg company recently furnished to the state five of the Cleveland tractors for rental to farmers and about ten days ago delivered two other machines to purchasers on York county farms. Many tractor prospects were secured during the week of the show.

TO CONSIDER GAS ENGINES

Chicago, April 8—The National Gas Engine Association will hold its eleventh annual meeting here June 3-4. An afternoon will be devoted to a joint meeting with a committee from the National Federation of Implement & Vehicle Dealers Association to discuss repair parts. Other subjects for consideration are the iron and steel situation, Government requirements as to gas engines and the method of handling these matters at Washington, the labor situation, the fuel problem, the future of farm gas engine business and others. A technical session will be held in connection with the Mid West section of the Society of Automotive Engineers.



The War in Pictures

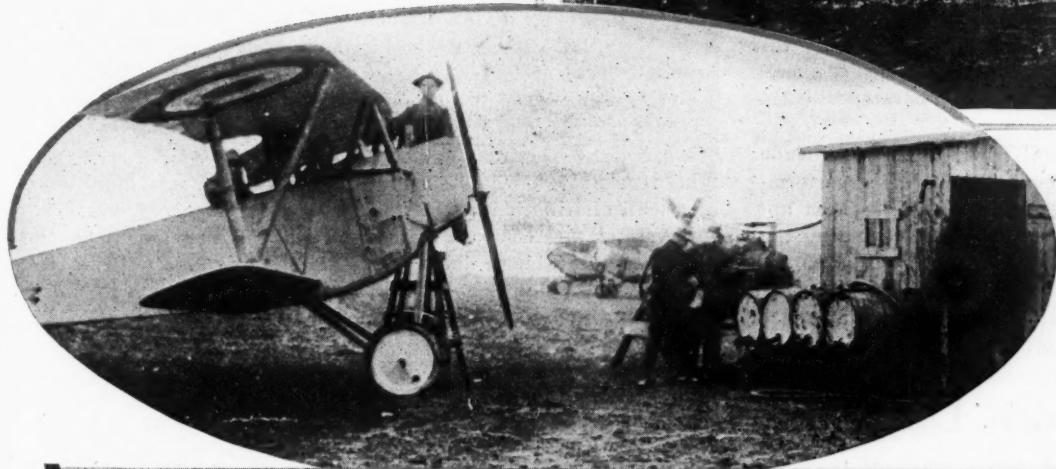
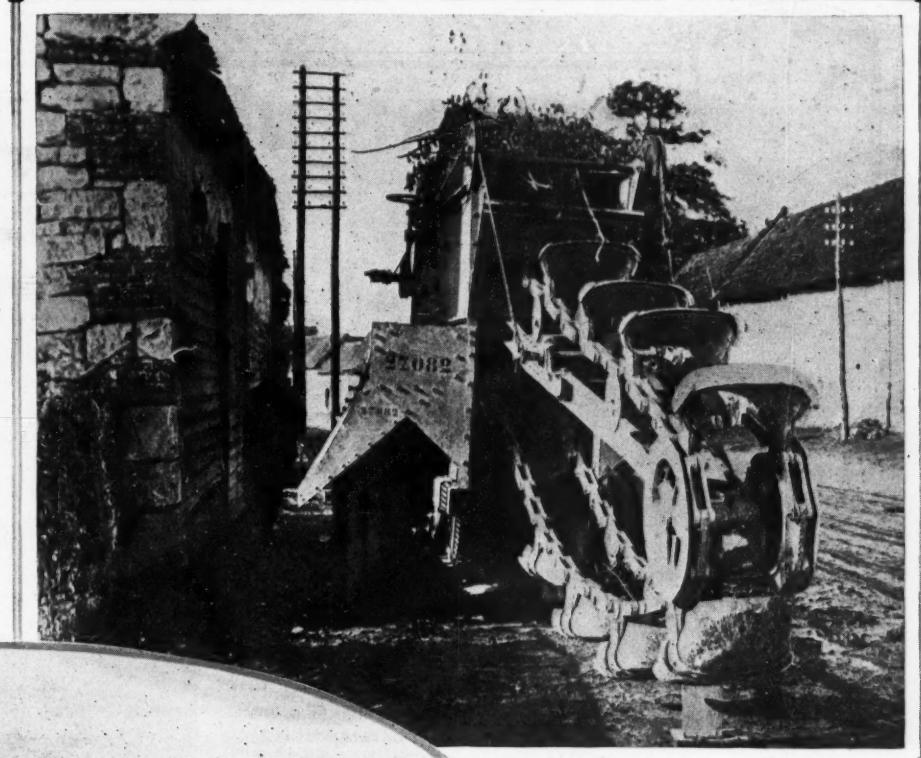
On this page are represented four mighty arms of war equipment—above, the great guns enroute to the front, the motor trucks that are hauling them, while a plane represents the aerial service and, below, men from our Navy see London from a motor car. The plane is a British scout plane flying over Palestine



You can see for yourself that Yankee tars were interested spectators of the royal procession to the opening of Parliament. However, it was remarked that the tars suppressed their excitement and did not shout unduly

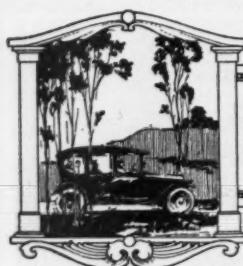
A French trench-digging machine attached to a motor truck. This is a new type of machine and has been used to good advantage by the French on the Western front in digging

Filling the gas tank of a speedy plane for our boys in France. This is from actual service. The plane is getting ready for an observation flight in enemy territory to aid the guns

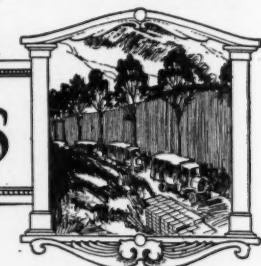


Camouflaged tanks are some of the many instruments of war used to help train men of the National Guard for service over there. This one belongs to New York soldiers who are at Camp Wadsworth





EDITORIAL PERSPECTIVES



Truck Mail Service

LONG with the development of return loads bureaus and trucking routes we must not overlook the importance of continued development of the Government-owned motor truck as a mail-carrying facility. Aerial mail service necessarily must pass through an organization stage, and meanwhile the truck already has proved its value, both in the cities and on the parcel post routes in which it has been tried out. Long and exhaustive tests in many of the most important mail centers of the country have pointed out the motor truck as the only means which is flexible enough to meet every requirement and to enable an even broader mail service than now is in effect. The inauguration of parcel post service whereby such packages as those of hundreds of newly-hatched incubator chickens are transported through the mails is but another proof as to the untried possibilities of a mail service with the motor truck as a common mode of transportation.

* * *

DURING one year the fleet of mail trucks in Chicago made only one failure of delivery to every 2,900 trips, a performance which, it is claimed by postoffice men, has never been approached by any other form of mail transportation. During the heavy snowstorms in Chicago in January no failure to make delivery was registered, though the postoffice depended as usual on motor trucks. Government-owned truck service now is maintained in New York, Chicago, Detroit, Indianapolis, Nashville,

Buffalo, Philadelphia, Pittsburgh, St. Louis and Washington. But this is not enough. The advantages of mail by motor truck should not be limited to the larger cities. The smaller city and the farmer has as much right to the superior service possible with motor service. The R. F. D. man should cover more territory and cover it more quickly with a Government-owned motor truck at his service. There could be consolidated rural mail routes, just as there are consolidated school districts and other community combinations, and on such routes the employment of motor trucks should not be an appreciable factor in the cost of delivery.

* * *

THAT the use of motor trucks in the mail service for smaller localities and in the open country would be more feasible even is evident in face of the results obtained with trucks in city service. Though the value of the motor truck, as shown in New York and in every other city where mail is carried by trucks, is greatest in the transfer of large quantities of mail of all classes between stations where the mail traffic is heaviest, the high peaks of mail distribution at the busiest stations occur at hours when the streets are comparatively clear, and the mail trucks handle the biggest volumes during non-congestion periods. While this same condition of congestion and non-congestion is never so distinct in the smaller cities and towns and country the principle likewise should apply there.

More Daylight—More War Work

THE United States is now in the second week of the new regime of the extra hour of daylight. Already workers as a whole, no doubt, have begun to realize the great saving in time which can result, provided that extra hour is made use of. Interesting figures compiled by Kissel show that if every one of the 4,565,000 passenger car owners in the country would devote that new hour to patriotic work of some kind, it not only would result in 4,565,000 additional hours a day, figuring just the owners, but with passengers in each car, say three, would make 18,260,000 hours, a total of 3,232,020,000 additional hours devoted to winning the war during the daylight saving period of 177 days. If the work during this number of hours was worth about 50 cents an hour to the Government the sum total would nearly equal the first Liberty loan.

* * *

IF each of these owners should start a war garden of an acre near his home town, it would mean the tilling of 4,565,000 acres of land. If while driving to his war garden each owner

would give four other war gardeners a lift, it would mean 22,825,000 acres working to cut the high cost of living.

* * *

IF the 435,000 or so trucks in the country would make use of this additional hour in haulage, it would mean a total of 767,950,000 miles during the daylight-saving period. At an average of 2½ tons a truck, this would mean a tonnage of 1,087,500 more tons of goods a day, or 192,487,500 tons during the 177 daylight-saving days that could be hauled, figuring on 2½ tons an hour.

* * *

WHETHER one is inclined to figure up the savings in this way or not, there is no denying the need of an extra hour somewhere each day to help push the cause of our country along and, just now, to help boost the Third Liberty Loan over the top. If you make use of your extra hour and every other car owner does the same, there can be no question but that the total of service gained will have an effect similar to, if not identical with, the lines suggested here. What are you doing with your hour?

Doubling Michigan's Power Farming

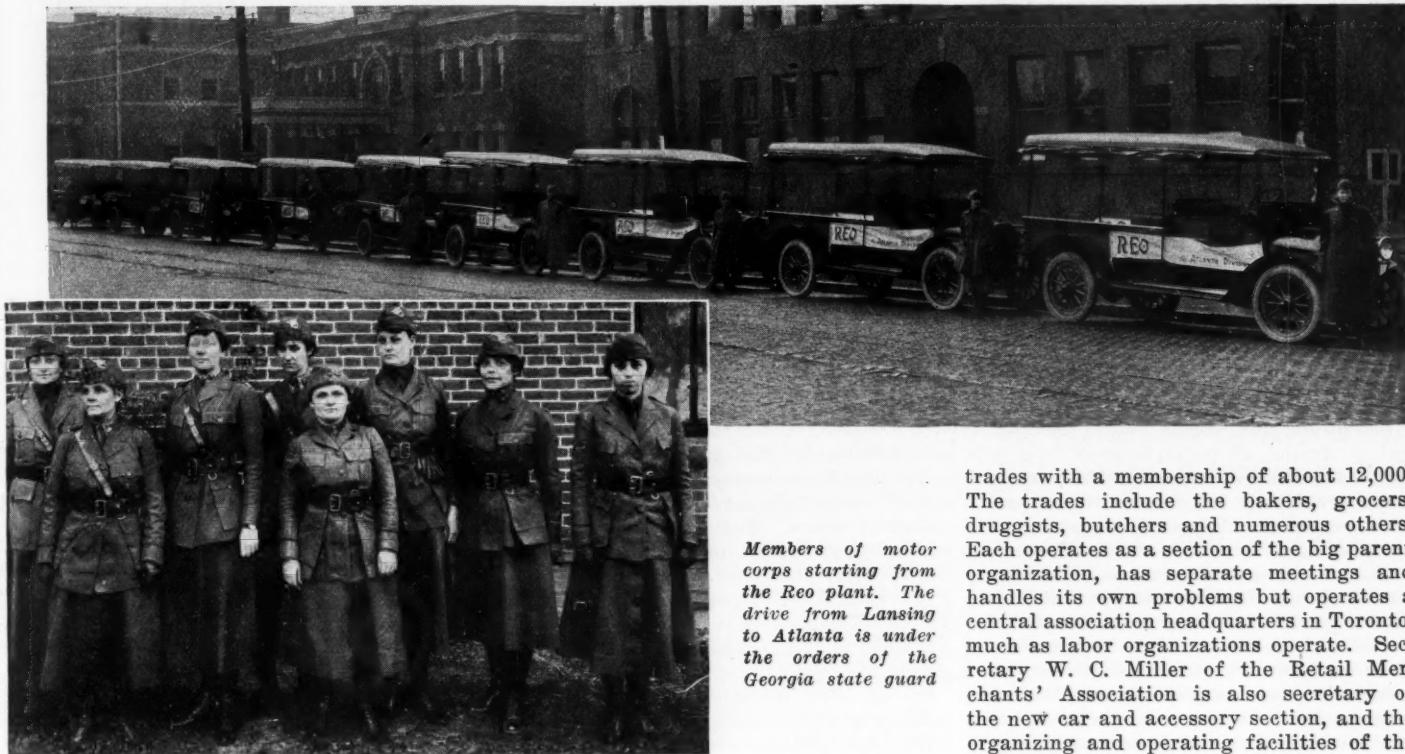
TWO significant facts are brought out prominently in the distribution of 1,000 Fordson tractors among the farmers of Michigan. One is that the power farming facilities of the state practically have been doubled within the period of a single month. The other is that the possibility of effective co-operation between manufacturing industry, state executive departments and individual farmer enterprise has been demonstrated. To these it might be pertinent to add a third fact which has great suggestive value, namely, that the incentive to action uncovered a great poten-

tial demand and converted it into an actual demand which manifested itself at once instead of being delayed through a long period of time.

* * *

HOW these tractors were sold has no special importance. The essential fact is that they have been sold. Whether or not tractor buying was facilitated by state interposition is nothing to the point. The important fact is the practically immediate increase of the agricultural productive capacity of a state.

Woman Motor Corps in Driveaway



Members of motor corps starting from the Reo plant. The drive from Lansing to Atlanta is under the orders of the Georgia state guard

LANSING, Mich., April 5—A driveaway of ten Reo 3/4-ton trucks left the factory at noon Tuesday for Atlanta, Ga. With the exception of the lead wagon, which is driven by K. T. McKinstry, sales manager of the Reo Atlanta Co., Atlanta, Ga., who will act as pilot, the remaining nine wagons are driven by khaki-clad women.

The nine women comprise a squad of the Atlanta division of the National League for Women's Service and are under command of Capt. Katherine Van Ecyk Harrington. The squad consists of Captain Harrington, Lieut. Courtney Billups, a sergeant and six privates, all expert drivers. The women received their training at Camp Gordon, near Atlanta, and are subject to call at any time for Government service. They are on the present drive under orders from the Georgia state guard.

The trip from Lansing, Mich., to Atlanta, Ga., is approximately 1025 miles, and a week's time will be consumed in making the drive. At Jeffersonville, Ind., every truck will be loaded to its capacity with war supplies for Camp Gordon and will be under guard from Jeffersonville to Atlanta.

NO SPEEDING ON DRIVEAWAYS!

Detroit, April 5—A joint letter is being prepared by the Detroit Automobile Club, the Monroe Chamber of Commerce and the Toledo Automobile Club to be sent all the motor car manufacturers in this territory, asking them to caution all drivers taking cars from the factory overland to stay within a speed limit of 30 m.p.h. Although nearly all the manufacturers now are cautioning drivers to limit themselves to a speed of 18 m.p.h., complaints are being made that many of the driveaways exceed a speed of 40 miles. This is not only harm-

ful to the car but proves dangerous to the drivers. It is reported that many men brought to the factories to drive away cars drink while enroute or before they start, making for unsafe driving on the highways. It is pointed out that dealers should use care in selecting capable and reliable men for driveaways. For example, a train of six-

ARE YOU ONE OF THE "HICKS"
 WHO STILL SAYS
 "PLEASURE CAR"
 WAKE UP!—SAY
"PASSENGER CAR"
 DON'T BE A
RIP VAN WINKLE

COPRIGHTED
CHICAGO AUTOMOBILE TRADE ASS'N. CHICAGO, ILL.

teen cars were running at a speed over 40 m.p.h., the cars being only 4 or 5 ft. apart. The leader suddenly stopped at a railroad crossing, causing all the following cars to jam their radiators. Drivers very often are inclined to appropriate the road at dangerous speed. One driver stayed on the same path until he nearly touched an approaching car. The latter to avoid an accident swung into the ditch, and the factory driver escaped with little injury when his car turned over in the opposite ditch. Monroe for the last month has been fining speeders at the rate of ten to fifteen a day.

ONTARIO DEALERS ORGANIZE

Toronto, Can., April 4.—The motor car and accessory dealers of Ontario have formed an association as a section of the Retail Merchants' Association of Canada, which has enrolled in its ranks various

trades with a membership of about 12,000. The trades include the bakers, grocers, druggists, butchers and numerous others. Each operates as a section of the big parent organization, has separate meetings and handles its own problems but operates a central association headquarters in Toronto, much as labor organizations operate. Secretary W. C. Miller of the Retail Merchants' Association is also secretary of the new car and accessory section, and the organizing and operating facilities of the Retail Merchants' Association with its headquarters at 2 College street, Toronto, are at the disposal of the new section.

The officers of the new association, or section, are: Chairman, S. H. Rowed, Ontario Garage & Sales Co., London; first vice-chairman, Joseph J. Duffus, Ford dealer, Peterboro; treasurer, Henry Angrave, Anbrove Brothers, Kingston; secretary, W. C. Miller.

The convention was called for Monday, Tuesday and Wednesday. Monday about fifty men appeared during the day and registered, and Tuesday and Wednesday there were addresses and discussions with the election of officers Wednesday afternoon.

DRAIN ON HORSE POWER

Washington, April 5—Some idea of the need for the utilization of power farming can be gained by perusal of the figures as to the exports of horses and mules during the last three years. In this period the United States exported 328,957 mules and 899,204 horses, making a total of 1,227,306 exported to the western war zone. The value of the horses is estimated at \$190,621,157 and the mules at \$65,501,036, a total of \$256,122,192. The valuation figures at an average of \$199 for the mules and \$211 for the horses.

NO FORD PLANT VISITORS

Detroit, April 5—The Ford Motor Co. has been compelled to bar visitors from its plant under rigid orders from the Government. It formerly was the practice of the Ford organization to maintain a courtesy department which furnished schooled guides, who were familiar with all phases of the industry, to anyone who desired to go through the plant. The records of the company show that people from all parts of the world have visited the factory.

Protect Cars Enroute

Theft of Parts from Vehicles in Transit by Railroad a Federal Offense

Maximum Penalty Ten Years in Prison

NEW YORK, April 5—The National Automobile Chamber of Commerce has been notified by W. G. McAdoo, director of the railroads, that thefts of lamps or other parts of motor cars while on railroad cars in transit in the future will come under the Federal law instead of under state laws as heretofore. This means that these thefts instead of being treated as petty larceny acts will, under the Federal law, be liable to a maximum penalty of ten years' imprisonment. This was made public at the regular monthly meeting of the N. A. C. C. Wednesday.

A new ruling has been handed down by the Treasury Department at Washington with regard to the 3 per cent tax on motor cars. The ruling is that branch houses shall be treated as factories so that when a branch house sells a car it will have to pay the 3 per cent tax on the retail price the car is sold at. This new ruling is directly opposed to the earlier understanding of the law and is considered very unjust by the N. A. C. C. The ruling has come from the deputy commissioner at the Treasury Department in Washington and is being protested by the N. A. C. C.

The crating of engines shipped by railroad came up for consideration in that the classification committee of the Railroad War Board has been planning to require the boxing of engines for shipment instead of handling them in open crates. J. V. Marvin of the traffic committee submitted arguments opposing such a regulation and it is hoped that some adjustments may be obtained before definite rulings have been made.

Some makers are driving away through their dealers 25 per cent of the cars manufactured during the last quarter, and there are a few concerns in which 25 to 30 per cent of their product is being driven overland. As a result of this the industry has been doing its share of relieving the railroads of as much freight as possible. As a result of these driveaways the railroad carload shipments of motor cars during the last quarter have dropped off as compared with the corresponding quarter a year ago.

FORD PARTS COST MORE

Detroit, April 5.—Contrary to the rumors that the Ford Motor Co. contemplates decreasing of prices of parts, it is stated by the company that prices have advanced on a dozen different units. The price increase became effective April 1.

OVERLAND PROFITS \$3.16 PER

Toledo, Ohio, April 5—The net income of Willys-Overland and its subsidiaries for 1917 was \$6,121,544, which is equivalent to \$3.16 a share on the common stock. This is after all deductions, including a reserve

for taxes, and compares with \$9,565,718 in 1916, equivalent to \$5.71 a share on the common stock then outstanding.

The net earnings, after ordinary deductions and reserve for taxes, increased slightly in 1917, being \$10,193,490 as compared with \$10,016,420 in 1916. The decrease in net income was due to an allowance of \$1,330,798 for depreciation and an increase in interest charges.

Orders for airplane engines and parts now amount to more than \$12,000,000, and further orders are assured. The company has received an ordnance contract amounting to \$15,000,000 and has completed negotiations for a munitions contract. Plans have been made for filling truck contracts as other means of counteracting the passenger car curtailment.

PIERCE-ARROW EARN \$11 PER

Buffalo, N. Y., April 5—Net earnings for the Pierce-Arrow Motor Car Co. for 1917 amounted to \$3,629,472 after deduction of taxes. The balance of net profit after payment of preferred dividends is equivalent to \$11.19 a share on the outstanding stock as compared with \$13.08 in 1916. The surplus increased from \$242,215 in 1916 to \$2,415,963 last year. Gross sales were \$32,565,908 as compared with \$18,687,287 in 1916, an increase of 75 per cent. Much of this was due to war orders from the United States and Allied governments. Unfilled orders for trucks and passenger cars totaled 5098 Jan. 1 of this year, against 1343 Jan. 1, 1917.

February Exports Slow

Smallest Total for Any One Month in Last Three Years

WASHINGTON, April 5—Exports of motor cars, trucks and parts during February were the smallest in three years. Fewer shipments were made that month than in any one month since February, 1915. The total value amounted to \$6,958,808, which is 41 per cent less than the January valuation and 9 per cent less than the amount shipped in February, 1917. In all 674 less passenger cars were shipped in February, as compared to January. Truck shipments declined from 1156 in January to 756 in February, and the value decreased 45 per cent. Fewer parts were shipped.

Much of the decreases in passenger car exports is due to the decline in exports to British South Africa, Australia and New Zealand. Australia took 144 in February as compared to 931 in January. New Zealand bought 221 in January and 110 in February. British South Africa bought 231 in January and 31 in February. Canada's total, on the other hand, increased from 692 to 919.

Few trucks were shipped to the Allied countries. France took only eighty-six as compared with 662 the month before, and none was sent to the United Kingdom. Canada led in the number of trucks bought, with a total of 420, more than all the other countries put together.

New Propeller Wanted

Committee at Washington Asks Designing Engineers to Consider Problem

To Fill Need of Super-Charge Engine

WAshington, April 5—A steel air propeller combining a variable pitch is sought by the National Advisory Committee on Aeronautics, and the committee invites the attention of all designing engineers to the problem. The first requisite is a propeller that will fill the need for a super-charge engine, one which will enable an engine to maintain constant power at all altitudes. The great problem at this time is due to the fact that all airplane engines now in use lose power as they attain high altitudes. When the air density is, for example, 50 per cent of the density at the ground the engine loses 50 per cent of its power and is forced to double power to attain the normal horsepower achieved at ground density.

The second requisite is a steel propeller; steel, because it is believed that steel will be the final material of which propellers will be made and the committee believes designing engineers may profitably try to find the solution to both problems at one time. Engineers of the committee offer the suggestion that the variable pitch can be controlled either by a governor, if one can be developed to alter the pitch without changing the engine's speed, or from the driver's seat, and further advise that designing engineers, in the designing of a steel propeller, should not give any attention to the design of the wooden ones now used. They point out that when steel bridges first were made the engineers attempted to follow the design of wooden bridges and failed until they evolved new designs based upon steel strength and structure. An ideal variable pitch propeller would be one that embodies the means for changing simultaneously the diameter, area and pitch for changes in air density.

All designs will be given careful attention and should be submitted in the form of drawings with brief description and necessary photographs to the National Advisory Committee for Aeronautics, Munsey building, Washington, D. C.

WHITE EARNS \$3,800,308

Cleveland, Ohio, April 5—The White Co. earned net profits of \$3,800,308 in 1917 after deducting taxes. This is equivalent to 24 per cent of the \$16,000,000 outstanding stock, approximately the same as in 1916, when there were no income and excess profits taxes such as this year.

125 SPRANGER SETS DAILY

Detroit, April 5.—The Spranger Wire Wheel Co. is now in production in its new factory. The production of the company is 125 sets a day, of which 75 per cent is wire wheels for planes for the government. This company was the first to get a government order for this type of wheel. The

company's building is on a 5-acre tract of land giving ample space for additional buildings if they are required. In addition to the wire wheel activities the company is producing a very superior tire carrier. The engineering department is designing machines for the swaged stay and strut wires for airplane and hydro-airplane work.

The company is working on two new types of wire wheels. It has been making tests on these for the last sixty days and expects to start production on one of the types in June.

MASON TO MAKE SOLIDS

Canton, Ohio, April 8—The Mason Tire & Rubber Co. will manufacture solid tires in addition to its pneumatics. A full line will be turned out, and production is expected to start on the small size within the next three months. It is expected that the new department will be turning out 100 solid tires a day by Jan. 1, 1919. In addition the company will make a new brand of pneumatic, the Kent tire, which will be manufactured exclusively for some of the largest jobbers in the United States.

SHONTZ BUYS SPLITDORF STOCK

New York, April 5—The H. B. Shontz Co., has purchased the entire battery stock and equipment of the Splitdorf Electrical Co., manufacturer of the Apelco storage battery for motor cars and trucks. The Splitdorf company will discontinue the making of storage batteries, and all parts for Apelco batteries can be obtained from the H. B. Shontz Co.

REO DISCONTINUES 2-TONNER

Lansing, Mich., April 5—The Reo Motor Car Co. will discontinue the production of its 2-ton truck. This move was made because of the contract it has with the Government to make tractors. Until the completion of the contract the company will make only one model of truck, that being the $\frac{3}{4}$ -ton speed wagon.

The price of the $\frac{3}{4}$ -ton truck after April 1 will be \$1,275 instead of \$1,175. The price of the chassis will advance \$75, making the new price \$1,175.

To Show in City Pier

Second Annual Exposition of Accessories, Trucks, Tractors and Motorcycles

Spaces in Half Mile Rows Are Available

CHICAGO, April 5—The second annual exposition of what originally was known as the National Exposition for Ford Accessories but which henceforth will be called the Automotive and Accessories Exhibition will be staged in Chicago's "seventh wonder," the Municipal pier, the week of Sept. 14. With the show held on the pier there is much to add to the attractions of the show itself. Whereas motor shows in the past necessarily have had many aisles, here there will be but one. Space which one exhibitor gets will be just as choice as another. Think of an unobstructed space nearly a half mile long and 68 ft. wide, and you get the setting for the show, which will stretch out into Lake Michigan with the blue of the water on one side and a parking space on the other for thousands of cars.

There are two sections to the pier, with a wide driveway between. In this driveway will be parking space and enough room between the parked cars for truck and tractor demonstrations. Transportation to the pier is excellent, one means being by motor bus. Conventions will be held every day of the show in the large auditorium at the end of the pier, where during the summer the city stages community singing programs. Such bodies as

300 MARCH CLASS B TRUCKS

Washington, April 6—More than 300 class B heavy-duty standardized war trucks were completed in March. It is expected that 1200 will be through production this month. Two thousand complete sets of parts are now on hand in the various assembly factories, and the prospects are excellent for a production of 3500 in May.

the Farmers' Institute, the Illinois Garage Owners' Association, Illinois Highway Improvement Association, National Hardware Dealers' Association and Motorcycle Manufacturers' Association will be asked to hold their sessions in the pier auditorium during show week. Dances and other amusement will be arranged.

The Chicago speedway has promised tentatively to hold its fall derby on the opening date of the show. Thousands of visitors will come to see the pier during the week, and this will give them an opportunity to combine a sight-seeing trip with one of inspection of accessories, trucks, tractors and motorcycles.

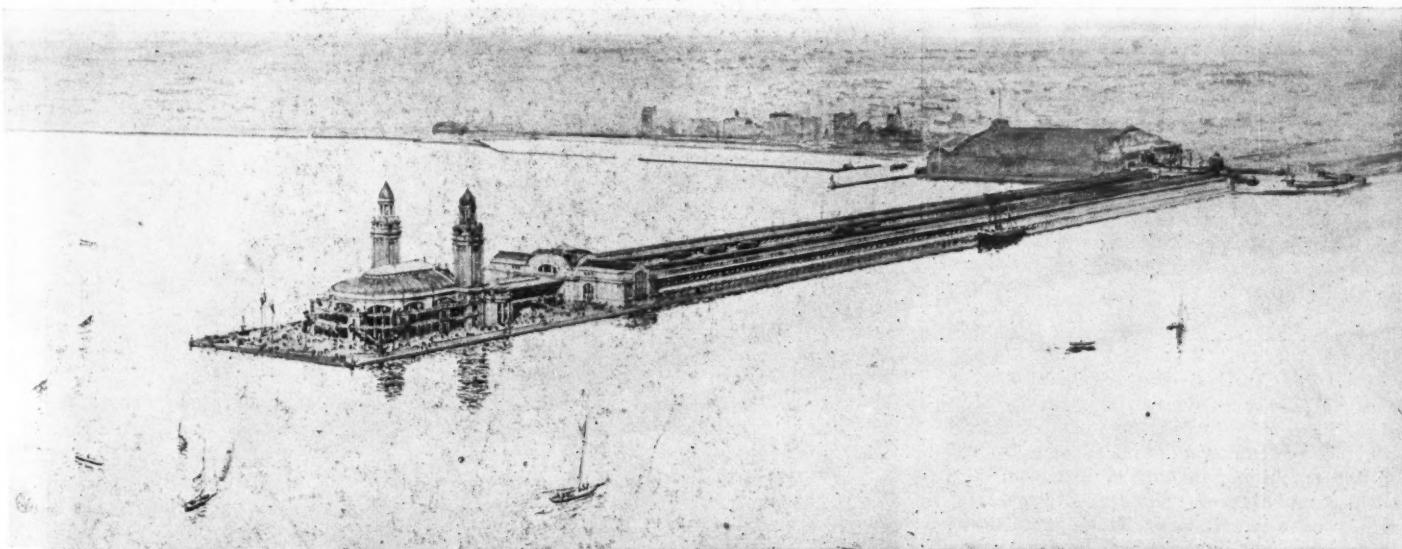
The officers of the organization which stands sponsor for the show are J. E. Dufield of the Bailey-Non-Stall Differential Corp., president, and B. L. Gray of Gray-Heath, treasurer. H. V. Beulow, Toledo, Ohio, who managed the show last year, has been engaged as manager for the 1918 show.

219 CARS SOLD AT SHOW

Chicago, April 8—Exactly the same number of cars were sold at the Exchanged Automobile Show this year as last year, but this year the cars brought in \$16,730 more than they did last year. The show was held under the auspices of the Chicago Automobile Trade Association and closed last night after a nine-day run. The total valuation of the 219 cars sold is \$193,775. The increase is due both to the better quality of the cars offered for sale and to the added values of the used car market. In addition to the cars \$8,820 worth of trucks were sold.

The attendance was 18,120, which is 2700 more than the attendance last year. Paid admissions amounted to only \$842, which is \$1,000 less than last year's box office receipts. This difference, however, is due no doubt to the wider distribution of free tickets.

That the show has been a success from the standpoint of the accessory men as well as to the passenger car exhibitors is attested by the average sales of the forty accessory exhibitors, \$750 each. The association has been well repaid for its trouble. Thomas P. Convey was the manager.



This is an artist's conception of the Municipal pier, where the Automotive and Accessories Exhibition will be staged this fall

Trade in Liberty Drive

Chicago Association Holds War Dinner and Donates Salesmen to Sell Bonds

Plans to Oversubscribe Its Quota of Loan

CHICAGO, April 6—The Chicago Automobile Trade Association, along with all the rest of the Nation, started out today on the Liberty Loan drive. The goal of the motor tradesmen is to oversubscribe the third Liberty bonds to the sum of \$1,800,000, which has been allotted them by the local loan officials. This is nearly twice the amount subscribed for the second issue, but the organization this time is much better than in the past, when the allotment was taken up easily.

For the present drive the association has been divided into several sections—passenger cars, trucks, accessories, tires, garages, livery, motorcycles, etc.—with a chairman for each division. The work will be extended to the whole industry in Chicago and will not be limited to members of the association. The members are donating salesmen to sell the bonds to the rest of the trade.

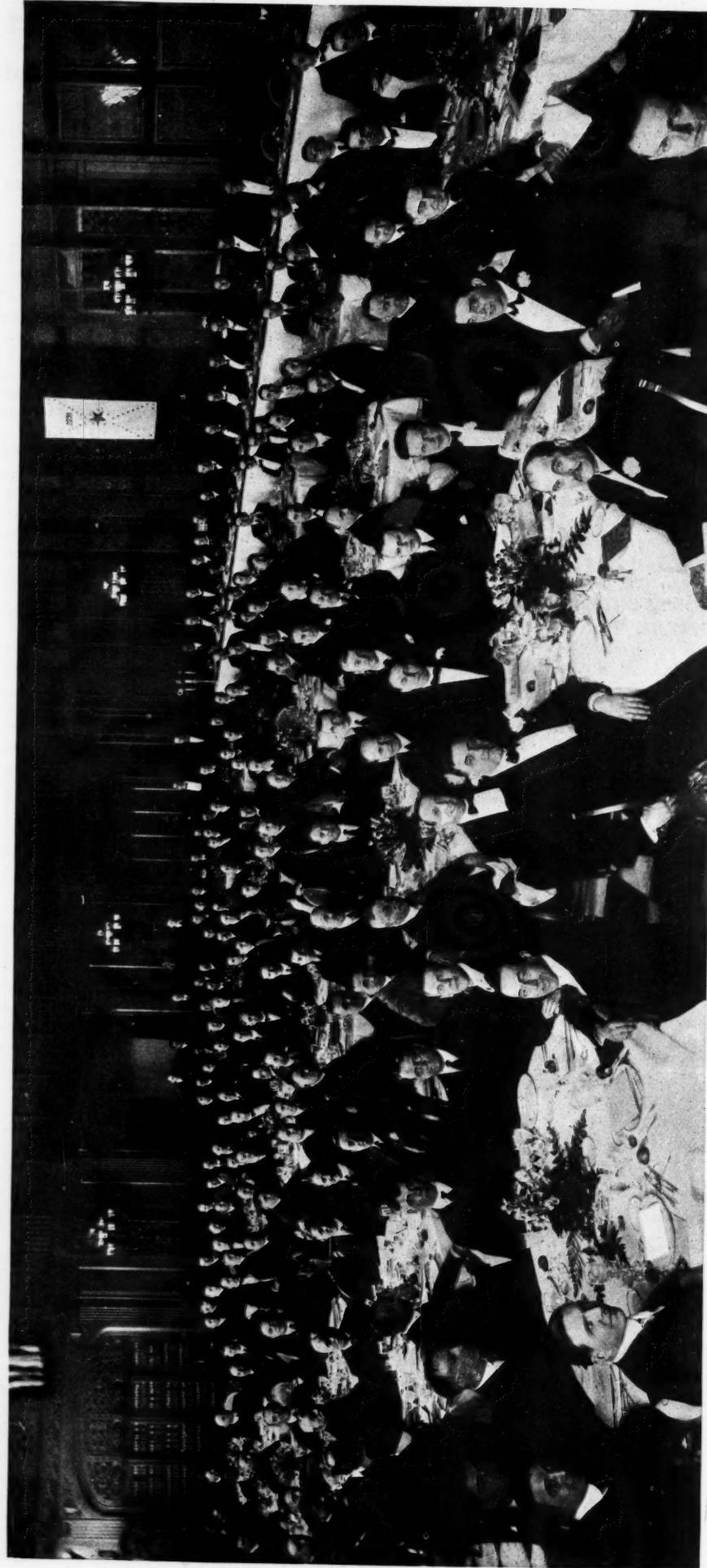
The keynote of the campaign was sounded last night by President Bird of the association at a war dinner which constituted the association's annual banquet. Speakers included F. W. A. Vesper of St. Louis, president of the National Automobile Dealers' Association; T. J. Toner, sales manager of the Maxwell company; E. LeRoy Pelletier, advertising manager of the Reo company, and returned soldiers from the front.

Need for the standardization of motor car laws was emphasized by Mr. Vesper. Mr. Toner came forward with the suggestion that dealers handling one make of car organize so that they can exert a more telling effect upon the factory, particularly influencing the design of new models. He warned the dealers to get ready for a trade war after the present conflict is over.

In emphasizing the fact that there is no such thing as a non-essential, E. LeRoy Pelletier announced that the Steinway factory in Germany, a branch of the musical instrument manufacturer here, made and sold more pianos last year than in any other year in its history. It is necessary to keep America's businesses making money if the war finances represented by the Liberty Loans are to be forthcoming. He stated that America has built more good roads in the last five years than there are in all Europe.

MOTOR UNITS IN PARADE

Chicago, April 6—Motor units were a feature of the great military parade that signalized the opening of the Third Liberty Loan campaign in Chicago to-day. Motor machine gun outfits, kitchens, canteens, ambulances and quartermasters' trucks were in evidence. The biggest showing among the motor cars, however, was made by the motor supply companies of



The annual banquet of Chicago Automobile Trade Association this year consisted of a war dinner just before beginning the Liberty Loan drive

the Illinois Reserve Militia and the motor transport units of the Illinois Volunteer training corps. Both of these are made up of citizens who have gone into the state service for the duration of the war to replace the Guard regiments which have been taken into National service. They furnish their cars and are trained for the transportation of men and supplies of the present state forces.

WHAT ST. LOUIS PLANS

St. Louis, Mo., April 8—Last Friday night when it was planned to flood the city with Liberty Bond posters overnight, the Automobile Club of St. Louis supplied 300 machines to carry the posters around. It is against the bylaws of the club to ask its members for machines, but when a call comes that the directors deem important enough they ask anyway. Friday night's call was one of these.

The trade organizations will appoint such committees as the general Liberty Loan committee requests. Practically all members of the trade associations are members of the chamber of commerce, which is the chief trade organization identified with the loan campaign and they will do most of their work there. For the first two weeks the campaign here will be general and the trade organization will be at the close. Twenty motor car salesmen are enlisted as bond salesmen to give time when called upon.

LOUISVILLE PLANS CAMPAIGN

Louisville, Ky., April 6—While the main drive for Louisville's quota of approximately \$8,000,000 Liberty bonds will be later, preparations already have started for arousing public interest in the loan and making it a success equivalent to that attending the two previous bond selling campaigns. Yesterday afternoon forty motor cars, furnished by Louisville Automobile Club members and dealers, carried pennants and posters to all sections of Louisville.

DES MOINES ALL SET

Des Moines, Iowa, April 6—The Third Liberty Loan campaign will be carried on in Des Moines by thirty teams. The motor trades bureau of the chamber of commerce will carry on the work in the motor trades, and a team of eighteen men will work exclusively in that field. R. J. Clemen, chairman, and H. C. Carr, vice-chairman of the

**The steam and electric railways are inadequate for our transportation needs.
The Motor Car fills the gap.**

motor trades bureau, will direct the eighteen men who have been organized into six different groups of three each.

The campaign is to start in Des Moines April 8 and will be pushed through in four or five days. Monday is the regular monthly dinner of the motor trades bureau, and it will be a patriotic one to start off the Liberty Loan campaign with a rush. Brigadier-General Getty, commanding officer at Camp Dodge, is to be one of the speakers.

MINNEAPOLIS OFFERS RESERVES

Minneapolis, Minn., April 8—The Minneapolis Automobile Trade Association has offered to the Liberty Loan committee and the war savings committee the use of the Minnesota Motor Reserve, Special Service No. 1, which means the use of 2000 cars or units of ten in 200 districts. This service has been accepted. The association also has offered this service to agents of the department of justice in the state.

NEW YORK IN DRIVE

New York, April 5—The Liberty Loan Committee of the Automobile Dealers' Association is rapidly perfecting its plans for the coming drive. At a meeting held very early it was decided to have 100 salesmen make a direct appeal to every member of the trade embraced by the committee, including cars, trucks and accessories, bicycles, carriage and body builders and saddlers. A Brooklyn division of the committee has been appointed, of which Arthur E. Randall of the Detroit-Cadillac Motor Car Co. is chairman. Other members of the committee are A. D. Corwin, Buick;

C. J. Maxson, Reo; C. M. Bishop, Dodge; William H. Cakouwenhoven, Locomobile; D. D. Martin, Martin-Evens; Frederick W. Brecht, Robert P. Lumley, Charles F. Batt.

MILWAUKEE LINES UP

Milwaukee, Wis., April 6—The participation of Milwaukee motor car manufacturers and dealers in the third Liberty Loan campaign will be even more thorough than during the second loan campaign, when the industry greatly exceeded its quota and ranked among the top-notchers in the percentage of over-subscription. An exceptionally efficient system of solicitation has been worked out by the Milwaukee Automobile Dealers, Inc., which organization embraces every distributor and dealer of consequence in Milwaukee. Its campaign not only will cover the distributors and dealers, but the entire industry, including makers of motive power, complete vehicles, parts, etc., the whole having been grouped as one for the purposes of the drive.

Saturday, April 13, the M. A. D. will provide a complete section in the Liberty Loan demonstration to be held in Milwaukee. It is hoped to have from 1000 to 1200 persons in line, a call having been issued to every garage, service station, salesroom, tire and supply house, repairshop, filling station, etc., to send not only the employers, but every employee who can be spared.

DORT GETS WAR ORDER

Flint, Mich., April 5—The Dort Motor Car Co. has received an order for 1,700 trailers of the two-wheel type. It is expected that delivery will start May 1.



Part of the motor supply and motor transport units of the Third Regiment, Illinois Reserve Militia, which were a feature of Chicago's Liberty Loan parade, April 6

A Year of War

American Troops on Firing Line 187 Days After Entry of United States—How Motors Are Serving Them Now

WAshington, April 6—From an automotive viewpoint the immensity of the work done by the United States since its entry into the war a year ago today is evident in the mere knowledge that:

Production of 10,000 new motor trucks is in progress for the Army, in addition to purchases of 3520 passenger cars and 6126 motorcycles with appropriate repair and replacement equipment.

More than twenty large companies are manufacturing airplanes; fifteen are producing engines; and more than 400 are producing spare parts, accessories and supplies.

The United States now is producing battleplanes of the latest European design equipped with Liberty engines.

The air personnel has been increased from sixty-five officers and 1120 men to 100 times that number, and eleven kinds of schools have been installed to increase the number.

Considering the growth of motor trucks and other motor vehicles, including airplanes the status at this, the first anniversary, of our part in the world war is as follows:

Motor Trucks

At the beginning of the war the Quartermaster Corps had about 3000 motor trucks, 450 motor cars, and 670 motorcycles. This equipment had been acquired for the Mexican expedition and for border patrol since March, 1916. Much of it was in bad condition after hard service with inadequate repair facilities. It was decided to use this equipment in this country and purchase new equipment for overseas.

The first extensive purchases were in June, 1917, when 9550 trucks were acquired. These were confined to four proved commercial makes. Soon after, to simplify repair and maintenance, the design of a standardized truck, of interchangeable parts, specially devised for heavy military duty, was begun. Design of the first truck was completed in October, and 10,000 were ordered. Production began in January, 1918, in five months from the beginning of the work. Two other designs of less capacity were prepared and are ready for production.

Standardization was also applied to the trailers, motorcycles, machine-shop trucks, tank trucks and much other automotive equipment. In all 3520 passenger cars and 6126 motorcycles were purchased for current needs. The standardized designs for all these have been completed and are ready for production.

The repair shops to maintain this equipment are keeping pace with the production and purchases. Standardized base shops, each covering 4 acres of ground and requiring 1200 mechanics to operate, and supplied with the latest mechanical equipment, have been designed. These shops are permanent,

SINCE the United States entered the war a year ago April 6, it has increased the Army from 9524 officers and 202,510 enlisted men to 123,801 officers and 1,528,924 enlisted men, and the Navy from 4792 officers and 77,946 enlisted men to 21,000 officers and 330,000 enlisted men.

American troops went on the firing line 187 days after war was declared.

American troops permanently took over a part of the firing line as an American sector in January, 1918.

Two weeks after war was declared contracts had been made covering the requirements of an Army of 1,000,000 men, the material comprising 8,700,000 items.

and will serve as depots and training centers for selection and organization of skilled personnel to be sent overseas.

Small mobile repair shops, or machine-shop trucks, have been ordered and are in process of delivery. These units employ a personnel of twelve skilled artisans each and are for first-aid repairs and minor replacement purposes and for such work as salvaging wrecked trucks.

Air Service

The air service has been called upon in the past twelve months to build an enormous structure of the most highly trained personnel and the most intricate equipment with practically no foundation to start from.

Three large appropriations, including the \$640,000,000 act passed without a roll call, made a total of \$691,000,000 available for the first year. All this since has been obligated. In all the years up to the outbreak of war less than \$1,500,000 had been appropriated for this service.

Last April the air service had an almost negligible force of sixty-five officers and 1120 men, three small flying fields, less than 300 second-rate planes, practically no aviation industry, and only the most scanty knowledge of the kaleidoscopic development abroad. The first two months of war were required to secure information, establish a staff and work out the program finally adopted. The problem was twofold, first, personnel, and, second, equipment.

Today the personnel is over 100 times that of a year ago, practically every member a skilled man who has gone through an intensive course of training. Schools of eleven different kinds have been instituted, courses of instruction laid out, and instructors secured, including foreign experts in a score of lines, as follows: For flyers at ground schools and flying fields; for mechanics at the flying fields and at over a dozen different factories; for photographers, balloonists, adjutants, supply officers, engineer officers, armorers and instructors of mechanics.

American aviators now are flying in the aggregate over 100,000 miles daily, or four times around the world. Only recently at one field 135 planes were in the air, a grand total of 882 hr. in one day.

A great amount of construction has been necessary to meet this program. Flying fields have been built, some of them with site selected, ground cleared and leveled, hangars and quarters erected and telephone, transportation, drainage, etc., installed in five weeks' time. So far as possible, they form the basis of a strategic network of fields distributed over the country along the main proposed aviation routes, and options were arranged to provide for permanent purchase at any time within three years at a stated price, if desired, as future aviation centers.

While this enormous educational system was being built up, American flying cadets were sent to Allied countries, almost the advance guard of America's military forces, and have now been in training for months in Canada, England, France and Italy. The first few have already gone over the German lines and have downed their first German plane.

The problem of equipment has been a more time-consuming problem. Last April only one company in the United States was anywhere near quantity production of training planes, and battleplanes were an unknown quantity. Now over a score of large companies have been encouraged and assisted in taking up the production of planes, about fifteen the production of engines, and over 400 other companies have been organized to provide the necessary source for spare parts, accessories and other essential supplies.

More than forty times the number of planes accepted by the Government last year have been accepted this year, sufficient to keep even with the demands for training, and a monthly rate of production reached five times the total 1916 output. New companies also are steadily coming into production.

Battleplanes

Battleplanes, however, presented a much more difficult problem. Very little was known of what had been done in this regard in Europe, where new types were rapidly being developed by the unending competition at the front. Delays of three months in getting samples to this country and last-minute changes of types after production was about to begin repeatedly caused delay.

Nevertheless, the United States is now actually producing battleplanes of the very latest European design. Immediate needs will be met by Allied manufacturers.

The Liberty engine has made good and solves the greatest problem of quantity pro-

duction in aviation. Whereas there are over seventy different types of engines on the western Allied front, the United States will appear with a single standardized type, which will greatly reduce the ratio of forty-seven men required on the ground by foreign services for every man in the air.

Planes and engines, however, are only a part of this intricate and scientific development. Over a dozen small instruments of the most delicate workmanship are needed for each plane, 60 per cent of them never made here before, to tell the speed, altitude, inclination and direction and the temperature of the engine; special machine guns synchronized to fire through the propeller, sights requiring the finest lenses, cameras of new and special designs, and a special kind of radio and five different types of bombs, as well as devices for directing and discharging them.

The supplies of vital raw materials in sight at the start were in many cases wholly

inadequate, and effective steps have been taken to provide the necessary quantities. The Northwest output of spruce has been commandeered, regiments of lumbermen organized and sent into the woods to get the lumber out, and the first cut-up mill built on the Pacific coast; the supply of dope for coating the surface of the planes has been increased by the building of four factories at Government expense; the supply of linen having failed, a cotton substitute has been developed; and castor oil for engine lubrication has been provided by the planting of 70,000 acres of beans. These are but instances of industrial undertakings of this nature.

Production has been decentralized out of Washington by establishing branch Government offices in the chief industrial centers, with power to deal quickly and effectively with manufacturing problems. Loans in money and machinery have been made; and a system for making partial payments in

advance, as well as for making prompt payments upon the receipt of approved invoices, instituted to assist manufacturers.

It is important, however, to see this program in its time perspective. Discussion of "a 100,000 planes in France" has created an exaggerated impression. After three years of war, neither side on the western front has been able on a given day to place more than 2500 planes in the air.

Naval Aviation

There has been marked progress in the development of naval aviation. Orders have been given for seaplanes, flying boats, dirigibles and balloons. These are being built in private establishments and also at the naval aircraft factory in Philadelphia. This factory was authorized by the Secretary of the Navy, July 27, 1917. On Aug. 6 the first contract for factory buildings was let, and Aug. 10 ground was broken for the first
(Concluded on page 32)



Help Him Get There by Buying Liberty Bonds

What Your Money Will Do For Your Fighting Forces

HERE'S WHAT YOUR \$50 BOND WILL BUY—

Trench Knives for a Rifle Company
 Twenty-three Hand Grenades
 Fourteen Rifle Grenades
 Thirteen Cases of Surgical Instruments for Enlisted Men's Belts
 Ten Cases of Surgical Instruments for Officers' Belts

WHAT A \$100 BOND WILL DO—

Clothe a Soldier
 Feed a Soldier for Eight Months
 Provide Five Rifles
 Provide Thirty Rifle Grenades
 Provide Forty-Three Hand Grenades
 Provide Twenty-five Pounds of Ether
 Buy 145 Hot Water Bags
 Buy 2,000 Surgical Needles

HERE'S WHAT YOUR \$500 BOND WILL FURNISH—

Bicycles for the Headquarters Company of an Infantry Regiment

WHAT A \$1,000 BOND WILL DO—

Buy One X-ray Apparatus Outfit Operating Instruments for a Base Hospital
 Furnish Pistols for All Men in a Rifle Company
 Buy One Rolling Kitchen (Motor)
 Provide Eight Ration Carts

money is invested in the bond the coupons provide interest. After the bond is redeemed by the Government and the money is paid back to the holder of the bond the money can be reinvested or put into the bank to draw interest there, as the owner sees fit.

Bonds Can Be Sold

Liberty Bonds are just the same as railroad bonds or any other securities. They are worth a certain amount of money and can be sold just the same as a railroad bond can be sold if the owner finds that necessary. The government, of course, recommends that bonds should not be sold once they have been bought unless the owner needs the money, but if he needs the money there is nothing in the world to prevent him from selling the bond and cashing it just the same as he would cash a check.

If everyone started out to sell Government bonds which actually are worth, let us say, \$100 each, there would be a supply that might perhaps be greater than the demand, and for a time it might not be possible to get the full \$100 for a one hundred dollar bond. They might be worth \$99 or \$98. However, unless one is compelled by necessity to sell the bond and make this sacrifice of a dollar or a fraction of a dollar on \$100, the money is perfectly good, because when the government comes to redeem the bond it pays back the full value regardless of what they might be selling for on the market at that particular time.

Will Sell for More Than Cost

As a general rule, Government bonds sell for more than they cost because the security is so good and the interest is sure. It is said that enemies of America have endeavored to stop people buying bonds by rushing into the stock market with a great quantity of them and trying to force them down in price, thus making many people believe that the bonds were not a safe investment. This forcing down of price can be accomplished temporarily with any securities. If enough of them are put into the market the price goes down temporarily, but once the supply ceases the price goes back again, and in the case of Government bonds it generally goes back above the amount that was paid for them. *When we return to normal conditions the bonds—as shown by history—will undoubtedly go back above par and you can sell a \$100 bond for considerably more than \$100. Before the war government 3 per cent bonds were selling for about \$104.*

If the Bond Were Lost

Supposing you should lose a \$5 bill? If you had the number of the \$5 bill and could trace it by its number you might get it back, and if you have the number of the bond, which number is also on the interest-bearing coupon, you might eventually be able to get the bond back. But a bond of the ordinary kind is just the same as a bill. It belongs to whoever happens to have it.

Protection in Registered Bonds

Yes, you can buy registered bonds. These registered bonds do not have interest-bearing coupons, but on every interest date the Government sends you a check and it has a record of the owner of the bond. This prevents the interest going to any other than the holder of the bond, and when the

What Are Liberty Bonds?

A Bond

A bond is a promise to pay by an individual, a corporation or government a certain amount of money with interest on a certain date.

A Liberty Bond

A Liberty Bond is a promise of the United States Government to pay a certain amount of money with interest on a certain date.

Security for Liberty Bond

There is no particular group of assets named as security for this bond, but it is secured by the promise of the Government of the United States of America. In order to pay this bond the Government could, if necessary, levy any kind of tax necessary to pay the bond. This means that everything that you can see is security for this bond. All the resources and property in the country are the security, no matter who happens to be the owner of them at the present time.

Safety of Investment

They are the safest securities in the world. A railroad may fail and go into the hands of receivers, but it is not conceivable that our Government would meet any such fate—providing we win the war.

These bonds are a safer investment than railroad securities and bonds issued by corporations.

"Providing We Win the War"

The resources of America are ample for winning the war and it is impossible for this country to be defeated if it goes into the contest with all its energy, but the country is nothing except the people of

which it is made, and if they do not support the war there may be disastrous results. The one sure way to make the bonds good is to buy them.

How the Interest Is Paid

A bond is just like a book. The front page of the book is the bond itself; the latter pages are made up of little coupons of stamps, each one of which is good for the interest on the bond for a six-month period. On these little coupons it tells the date on which they are payable. On those dates you simply tear off or cut out these little coupons, take them to the bank and deposit them just the same as you would real money. They are just the same as money.

Redemption of Bond

On the second Liberty Loan there were coupons enough to last thirty years, but the law provides that the Government may redeem the bond after fifteen years if it cares to do so. If you have cut out fifteen years of interest-bearing coupons and the Government decided to redeem the bond it would simply take it back and you would receive no more interest.

That would not be cheating you out of fifteen years' interest because you would be given back the money you had paid for the bond at the beginning.

You Get Back All the Money That You Paid for the Bond

The money that is paid for Liberty Bonds is not given away. It is simply invested. It is just the same as though it were put in the bank, except that it has to remain for a certain time. When that time is up the money is returned to the person who holds the bond, and for all the time that the

time comes to redeem the bond you are sure of getting your money. The only objection some people have to having a registered bond is that there is just a little bit of red tape required to sell it. If you wish to sell it you have to go through the formality of transfer, and most people would rather take the chance on a plain ordinary bond than go to this trouble in case they wish to sell it. You would rather have a \$5 bill than a \$5 check, because you can cash the bill anywhere and you have to be identified before you could cash the check. There is just a little bit more trouble, although the one is just as good as the other. The same comparison applies to bonds. The plain unregistered bond can be passed around the same as currency, whereas a registered bond cannot be so handled. Security in the latter case is, however, greater. Furthermore, registered bonds in the last loan were not issued in the small \$50 denominations.

Liberty Bonds Put Your Money to Work

If you took a \$50 bill and kept it in your pocket it would be useless; it would not be working. If you invest it in Liberty Bonds instead of putting it in a bank you have really put your money in savings so far as you are concerned. The savings are represented by the Liberty Bond. But now, what becomes of the \$50? You turn it over to the Government and the Government, which needs a great many supplies of all kinds at this time, goes to some manufacturer and buys goods with the \$50. The manufacturer pays the \$50 out again to his employees and to the makers of raw materials and the money immediately goes back again into the channels of trade and into circulation.

Perhaps the identical \$50 bill that you paid for a bond may in a few days come back again into your own hands. And so you see that money that is invested in bonds is put into circulation instead of being tied up. Furthermore, the man for whom you work may be in need of that very \$50 bill to help pay you your salary during the coming month, and if he can't get that \$50 bill, how is he going to pay you? If you fail to buy bonds you are simply holding out upon yourself. You are hurting business, you are tying the hands of the men in the trenches and you are getting a millstone ready for your own neck.

COLUMBUS TURNS OUT

Columbus, Ohio, April 5—The Columbus Automobile Club has organized for the third Liberty Loan drive and is coöperating with the central committee of bankers to make the drive in Central Ohio a success. To that end all car owners who could give the time were called upon to furnish their cars for the distribution of Liberty Loan advertising. In all more than 50,000 signs and posters were distributed in Columbus and in the section surrounding the city.

BOSTON OPENS DRIVE

Boston, Mass., April 6—President J. H. MacAlman of the Boston Automobile Dealers' Association called a meeting yesterday of the directors to plan for the Liberty Loan drive. George T. Kimball is chairman of the committee to have charge of the work. A committee of forty men will



be chosen at a meeting to be held Tuesday, and there will be a meeting Thursday afternoon to which all the men and women in the car, truck, tire, garage and accessory lines will be invited. This will be addressed by prominent speakers. There will not be teams working this year like last fall, the committee of forty taking over the work. No set amount has been asked from the trade, but the men expect to get a large sum.

In the Liberty Loan parade to-day here the motor trade was well represented. Some had special floats. The U. S. Tire Co. had a Clement Bayard fighting plane on a Pierce-Arrow truck.

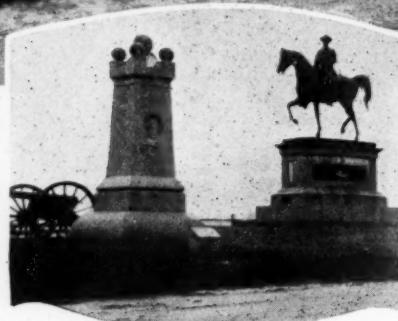
McFARLAN INCREASES PRICES

Connersville, Ind., April 5—The McFarlan Motor Co. has increased the prices on all its models \$400, effective April 1. Wire wheels are optional at additional cost.

Pennsylvania's War Roads



Hairpin turn at Fort Ligonier, Pa. This is in the heart of the Alleghanies with good grades



Passing through Gettysburg the Government trucks all pass the battlefield and its monuments

ANY road used to be considered a good road from the motoring point of view if it was maintained in satisfactory condition during the touring season, say, from the middle of April to the first of December. It was taken as a matter of course that in the remaining four and a half months, the winter snows and the spring thaws would render it more or less impassable. To-day, under war conditions, no community can boast of having good roads unless its roads are open for motor traffic twelve months in the year. If the highways are to supplement, as they must supplement, the railroads of the country in meeting the transportation needs of the times, the roads must be kept in condition all the year just as are the railroads.

The deficiencies of our principal systems of highways from the year-round point of view, have been forcibly impressed upon me as the result of two recent tours of exploration I made with the object of determining the feasibility of driving new cars and trucks from the car factories of the Middle West to the Atlantic seaboard. When I say feasibility I do not mean only the possibility of driving cars and trucks through to their destination. I mean the possibility of bringing them through without subjecting them to any abnormal wear and tear prior to their delivery into the hands of purchasers. After examining the Mohawk Valley route, by way of Albany and Utica, and also the Lincoln Highway route by way of Philadelphia and Pittsburgh, I must report that over neither route is it possible, at the present time, to

By R. H. Johnston

R. H. Johnston is well qualified to criticise road conditions, as he is a pioneer tourist and president of the Mudlarks, a group of motorists who were in the New York-Pittsburgh endurance run of 1903. Mr. Johnson, who is manager of the New York branch of the White Co., recently drove over the route he describes.—Editor

bring through cars and trucks without subjecting them to greater strains than the purchaser could reasonably expect. In the case of Government trucks, I know from actual observation that almost all these trucks which have been driven through are

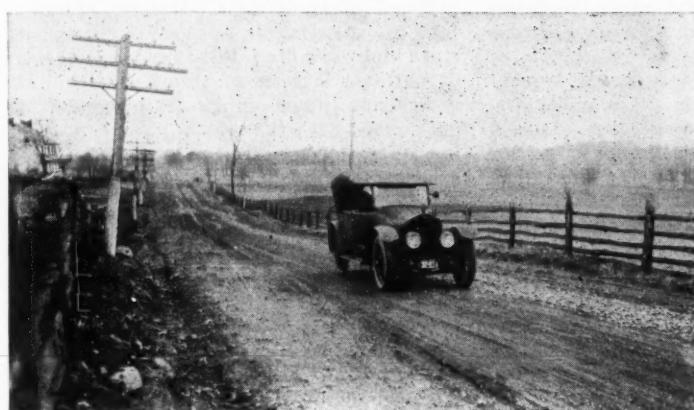
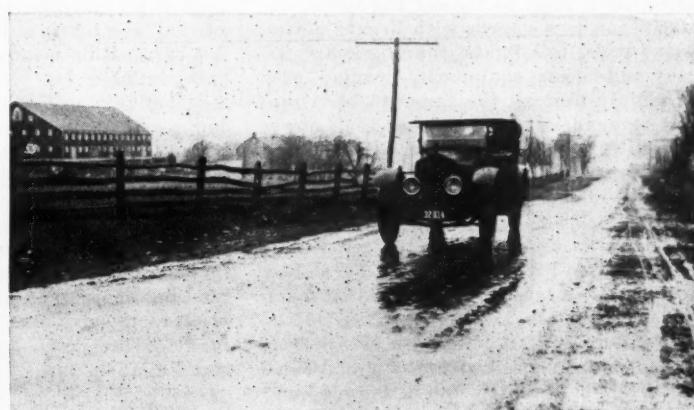
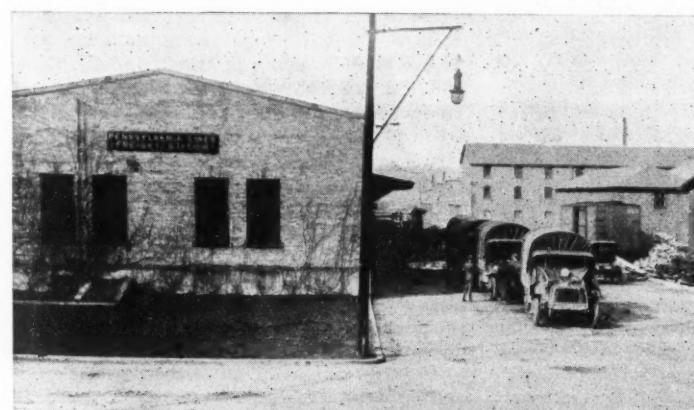
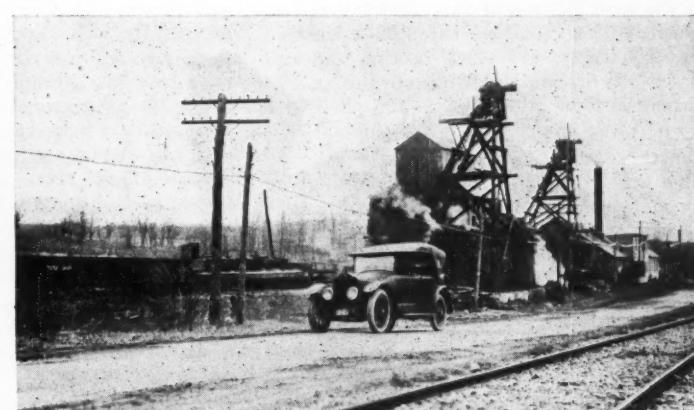
in need of a certain amount of overhauling before they are in a proper condition to send "over there."

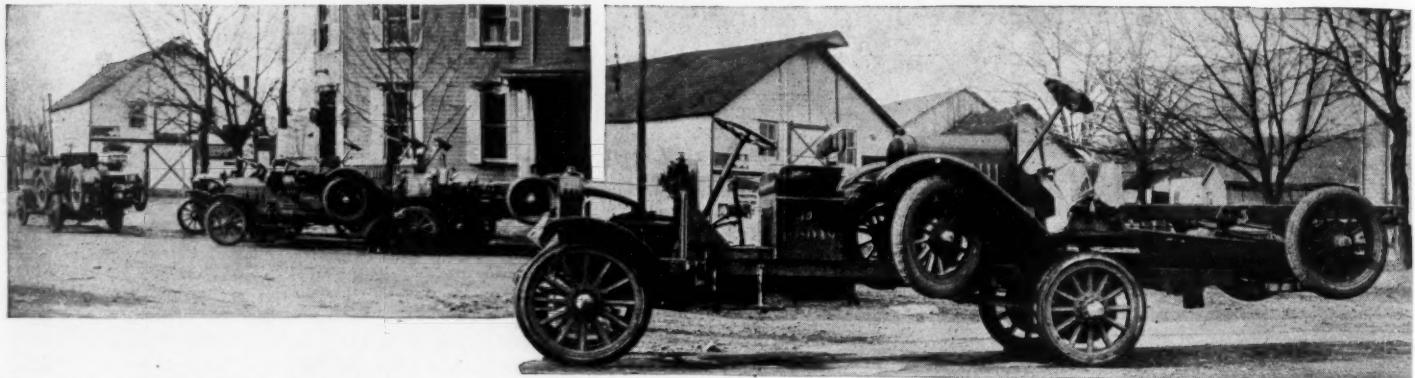
The neglect of an 18-mile stretch of road between Beaver Falls, Pa., and New Springfield, Ohio, has practically shut off, for the time being, motor travel between the Middle West and the Atlantic seaboard over this important route. Of course, it is possible to get through this bad stretch of road, as is being demonstrated every day, but no car or truck can come through there and be in proper condition to deliver to a customer without considerable work being necessary. When we traveled over this route from New York recently, we were fully advised in Pittsburgh of the



Trucks caught in a heavy snowstorm near Pittsburgh

Scenes Along Pennsylvania's War Roads

*This bad stretch of road near Beaver, Pa., was impassable**Pennsylvania operates a fleet of White dump trucks**Early work made possible by keeping snow from road**On the road to Bedford, showing huge tobacco barns**The trucks used the railroad to avoid a bad road**Stone quarries along the road are in war work**The state constabulary patrols the war road in Pennsylvania**Pennsylvania kept repair gangs at work on the war road*



How motor trucks are being delivered from factories to owners. Twelve trucks in this lot carried twelve more

condition of this road and, accordingly, when we came to the beginning of this bad stretch, we left our car and walked ahead through the fields to inspect the road.

The road was strewn with license plates, engine pans, tail lights, running-board fixtures and other equipment, proving only too plainly that all the cars had been running aground and that neither high power nor skillful driving were of any avail. I never saw a main road in such bad condition, and remember that I am president of the Mudlarks, the organization composed of those who went through the memorable New York-to-Pittsburgh Endurance Run in 1903. The reason the road is so much worse than the ordinary bog road is that the passage over the road of heavy Government trucks, some with 40 hp. and some with 4 hp., has created ruts in the road and the weight of the trucks has pushed down into the mud all the broken stone and other solid material which has ever been dumped on the road. Some of the drivers who had succeeded in coming through estimated that 200 cars were stuck in the mud and practically at a standstill, and others estimated the number as high as 500.

All the possible detours have been tried and those who have tried them tell the same kind of stories as those who kept on the main road, stories of sleeping all night in cars and in farmhouses, stories of tire chains lasting only a few miles, stories of farmers with teams getting rich quick, stories of mud and cold and despair. In fact, the only method which has proved effective for getting around this bad

stretch of road is that adopted by the Quartermaster's Department. The heavy motor trucks which are coming over the road for that department are now being carried around this bad road on railroad flat cars. This means of transportation is not available for privately-owned trucks. And yet this road was in fair condition a few weeks ago when it was frozen. It will be perfectly passable again as soon as the warmer weather has dried it out. Just when that time will come depends on how much sunshine and how much rain we have in the next few weeks. When authentic information is received that this stretch of road has thoroughly dried out, no one need hesitate to drive over the road from Cleveland to New York by way of Pittsburgh and Philadelphia.

Wonders by Pennsylvania

Pennsylvania has done wonders in road-building during the last few years. The road from Philadelphia to Pittsburgh is practically a boulevard all the way, particularly the western portion which has been completely rebuilt. The water-breaks on the mountain roads, which used to be a terror for tourists, have all been eliminated and the roads are drained by a modern system of culverts. Of course, there are the usual bad spots on the outskirts of the towns, between the points where the state highway ends and the city pavement begins.

It is obvious that two points in our road-building and road-maintaining program must be emphasized as they never have

been before. First of all, each state must build and maintain its roads, not only from the state point of view, but also from a national point of view. It must examine into the question as to how its system of state highways fits into the general scheme of national arteries of transportation. If it has not linked up its state system of good roads with the system in each adjoining state, it must do so at once. Secondly, each state must be made to see not only the necessity, but also the ultimate economy, of keeping snow off its roads in winter. If snow covers the roads during four or five months of the year, that means that every motor vehicle traveling over the roads during that period is using tire chains. It means further that every time there is a thaw, the water, instead of running off the road, is trapped by the snow and is held on the road to be subjected again and again to freezing and thawing with resulting disintegration of the road surface. If the snow is removed promptly from the road, tire chains are not necessary on the vehicles using the road, and the road is freed from the destructive action of recurrent thawing and freezing. The net result of keeping snow off the roads is a tremendous saving in road maintenance. This is not merely a theoretical consideration. This has been proved this year on the Philadelphia-Pittsburgh highway. This road has been kept free from snow, with the result that, despite the abnormally heavy traffic, the road is in need of fewer repairs this spring than in any previous year.



At the right is shown method for draining water off the new state highway. The trucks are Government owned

Steam Advantages in Brief

Power Range and Ease of Control Obtainable Are Emphasized in Three Papers

NEW YORK, April 5—Steam motor cars was a topic sufficiently interesting to bring out 300 members of the Metropolitan section of the S. A. E. last week, when three papers were read, two from the Stanley Motor Carriage Co., and one from the Doble company. All three handled the subject in a historical manner and spoke of the commercial advantages of steam as compared with gasoline, commenting on the fewer number of parts in steam machines, the possibility of using maximum torque under the most adverse conditions and securing the fullest efforts of the motor cars at lowest speeds, such as 1 m.p.h.

Prescott Warren, president of the Stanley company, introduced the subject by a historical review of steam, under the title "The Fork in the Road." By fork he referred to that period in the development of the motor car when inventive genius pursued the internal combustion engine and left the development of steam to a few firms. Mr. Warren believes that it was the spectacular idea of obtaining power direct from fuel in the cylinder of the engine that led engineering talent up the fork of the road represented by the internal combustion engine.

Store Up Power

In addition to what Mr. Warren described as the complications of the internal combustion motor car as compared with steam, he emphasized that steam cars store up power, whereas in the explosion engine type the limit of capacity for storing power is confined to the flywheel. The electric vehicle has this capacity for stored power but has four limitations. Its range of travel per battery charge is too short; it takes too many hours to restore its battery capacity; it lacks 40 or 50 m.p.h. speed performance; and the driver is conscious every minute that he has less power than he possessed a minute before.

Mr. Warren complimented the internal explosion engine by describing it as a marvel of ingenuity resulting from persistent inventive genius but concluded by declaring car performance that the public is demanding cannot be obtained with the internal combustion engine.

John Sturgess, also of the Stanley organization, gave some figures on the use of steam as a power, and emphasized the expression "range of power," which he used in a wider sense than the word horsepower as applied to the motor car. Range of power was described as the magnitude of force applicable to the driving wheels. Reserve power is the difference between the driving force utilized at any moment and that which may be utilized at such moment. Both are the direct result of range of effective cylinder pressures with given gear ratio and piston displacement. Mr. Sturgess compared steam and gasoline cars in this respect:

"The maximum mean effective cylinder pressure in the gasoline car averages about

100 lb. The steam car has in reserve cylinder pressure well up to 500 lb. Applying gear ratios and piston displacement to both types to obtain net driving effort or force, we will compare a 3½ by 5½, eight-cylinder gasoline car and a 3 by 5 twelve-cylinder gasoline car with a 4 by 5 two-cylinder steam car. Gear ratios will be approximately 4½ to 1 in the gasoline cars and 1½ to 1 in the steam car.

"The eight-cylinder will have a piston displacement, omitting non-working strokes, of 77 cu. in. per foot of car travel and the twelve-cylinder will have 104 cu. in. The steam car will have 41.4. Multiplying these values by the maximum effective cylinder pressure, we obtain the following indices of driving force:

Gas car, eight-cylinder (3½x5½).....	7,700
Gas car, twelve-cylinder (3x5).....	10,400
Steam car, two-cylinder (4x5).....	20,700

"From this it will be seen that the range of driving force and consequently reserve power in the steam car is greatly in excess of either of these cars which accounts for the remarkable acceleration and hill climbing powers of the steamer.

"These calculations with gas cars are based on direct drive high gear because the accepted standard of their performance is what they will do on high gear. They are advertised, sold and judged in service upon this basis.

"Of course, the gas car owner can shift to the low gear for greater power at reduced speed. But every time he does this, he concedes the claim that the steamer possesses superiority in not doing it. Moreover, he will do it only as a last emergency measure; he admits that he is ever forced to do it; so any effort on his part to derive controversial advantage from his ability to do it is distinctly insincere.

"The gearshift has well been called a makeshift. It is not a satisfactory solution of the problem. In fact, it is a most unsatisfactory solution. Every motorist is demanding a better one, and every manufacturer is trying to find it. The fact that no gearshift is needed with a steam car is one of the strongest reasons why we build such cars.

"It is not claimed that the steam car can maintain the above high tractive effort indefinitely at high speed. Such would not be necessary under any road condition ever likely to be encountered. Its temporary availability is all that is desirable. Even with 400 lbs. mean effective pressure, at 30 m.p.h. such tractive effort would amount to 80 hp.; at 50 m.p.h. it would equal 130 hp. This great amount of power is available for as long a period as road conditions would usually permit its use.

"The source of this great energy is the stored power in the boiler, represented by 60 lbs. of water at a temperature of nearly 500 deg. Fahr., and containing 1,500,000 ft. lbs. of available energy. This great potential energy is built up in advance in a form capable of instant use without waiting

for combustion to take place. It is one of the secrets of the steam car's performance. Such stored power is obtainable only with the steam boiler of liberal water capacity, or with the electric storage battery. It is quite impossible with any form of internal explosive engine.

"This range of power and its application by gearing the engine direct with the rear axle gives that smoothness of propulsion which is the most gratifying characteristic of the steam car which is apparent at moderate speeds and especially during heavy going. It is due to the fact that two double-acting steam cylinders produce a uniform continuous turning moment to the crank-shaft. The engine speed is always an indential ratio with the car speed; and at 60 m.p.h. the engine is running at 864 r.p.m. with 3456 piston reversals a minute, compared with say 2500 r.p.m. and 40,000 piston reversals per minute in a eight-cylinder gasoline line car."

Control of Steam

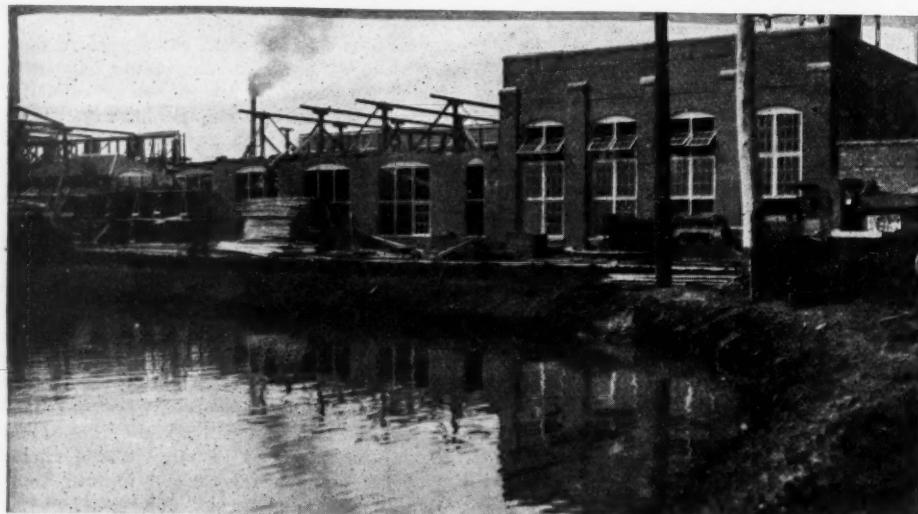
Mr. Sturgess referred to the psychological influence of having the control of the steam car centered in a single throttle lever. The throttle lever suffices to start the car from rest and control the power from 0 to 500 per cent above rating. The only thing the steam driver is cognizant of is the speed of the car, and this with steering is all he has to think of. Mr. Sturgess gave a picture of the driver of the gasoline car in which he has to give a certain degree of attention to engine speed to the extent of almost complete absorption when starting or in heavy traffic. The driver must maintain a mental picture of speed and conditions governing engine speed. He must be alert to their relationship, and this adjustment involves action by his two feet and one hand, or one foot and two hands.

With regard to starting the steam car Mr. Sturgess asserted that the general impression that much preparation and considerable time are needed for starting is erroneous. For 98 per cent of the starts steam is ready and the throttle movement is all that is needed. It is only when steaming up from cold in the mornings that the steam car may be behind the gasoline car in starting. From 5 to 10 min. are needed. With regard to the steam car not freezing in winter weather Mr. Sturgess stated:

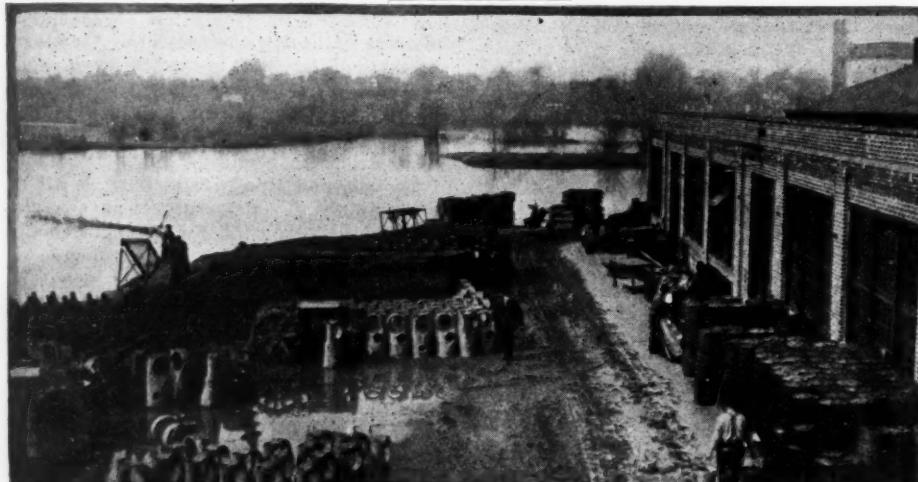
"The steam car does not freeze for the same reason that the building provided with a hot-water heating system does not freeze, but whereas the building has chilling windows, all susceptible parts of the car are heavily clothed with insulation. Consequently the small pilot always burning maintains the heat. If there is objection to long continued burning of the pilot, a small city gas jet with hose connection with the burner suffices and costs little. Finally the car may be drained with little effort, or even be permitted to freeze solid with but slight damage and that only to small parts of insignificant cost."

An 85-Tractors-a-Day Plant

Constantly Changing Makeup of Ford Plant
at Dearborn to Accommodate Demand



The new administrative building is growing up around the little building which formerly filled this purpose and will absorb it finally



Core sand from the foundry is being used to reclaim land for the factory building.
This is on the reclaimed land



This stock is necessary for eighty-five tractors per day. The lumber for its warehouse is seen in the background

THE Ford tractor plant does not look the same two successive weeks. The department found in one building may be in a building which does not exist three weeks from the time you saw it. No one knows how big the plant will be when it finally is completed. The schedule called for eighty-five a day by the end of March, 125 a day by the end of April, 150 a day by the end of May, 200 a day in June and 300 a day by next December.

The factory is to continue to grow in proportion to the demand for its output. As it is impossible to conceive what this demand will be, it is also impossible to conceive the future developments of the tractor plant at Dearborn, Mich.

A big office building which will house all the executives is growing up at the front end of the large, oblong plant of Henry Ford & Son—around the small brick building which houses the present inadequate offices. When the new office building is nearly complete, the roof of the small building will be lifted and replaced with a ceiling, so what is now a building will become a room in the large new structure.

Henry Ford owns a tract of land of several thousand acres at Dearborn. A large part of it is valuable farm land, which is plowed, cultivated and harvested by the tractors produced in the plant on the field acreage. There is plenty of room for expansion.

A Progressive Layout

The layout of the plant, as would be expected, is progressive, though the elaborate conveyor systems of the Ford Motor Co. are missing. The necessity of rearranging the floor space has precluded the possibility of using any elaborate conveyor system so far. This will come in time, but at present more elementary methods of conveying materials from one part of the plant to another are used. A large part of the work is done outside at the present time. For instance, the big castings which form the central part of the tractor, housing the gears and a part of the final drive, are made by the Ferro Machine Co. of Cleveland; the worms for the rear axle are made by Timken; the bronze worm gear is made by the Aluminum Castings Co., and similarly a great many other concerns contribute to some of the raw and fabricated stock employed in the manufacture of the tractor. Eventually, all these parts probably will be made under the roof of Henry Ford & Son's tractor plant, and even now in spite of the fact that production only started about the first of last September, a well rounded out manufacturing plant has been developed, with up-to-date methods and machines in every department.

As the manufacturing arrangements are now laid out, the raw material works up from the back of the plant into the machine shop, which occupies one side, and from there it passes into the assembling depart-

ment on the opposite side, after which it is led directly to the railroad. A large foundry building at the rear end of the factory is really the starting point of production. A great many of the castings used in the tractor are made in this foundry, and the remainder are bought outside and placed, after their arrival, into the productive stockroom, which is adjacent to the foundry building.

Both the products of the foundry and those which come from outside plants are placed in the productive stockrooms to be drawn upon for manufacturing purposes. Along one end of the foundry is the cylinder department which forms the connecting link between the foundry itself and the machine shop. The roughing operations are carried on at the back end of the machine shop, the parts working up progressively toward the front of the buildings and then across into the motor and tractor assembly room. The cleaning operations are done in that part of the foundry building which is adjacent to the machine shop. There the equipment includes snagging and disk grinders, benches, tumbling mills and the cylinder department. In the cylinder department the rough milling operations are carried on, the cylinder blocks being milled at top and bottom and both sides, the cylinded head milled off to shape and the crankcases likewise.

The cast top tank of the radiator and various medium-sized parts are taken care of in individual departments. The departments are individualized throughout. There is a department for the radiators, another for connecting rods, transmission housings, cylinder department, differential housings and worm wheels, etc. The tool crib and tool inspection department is centrally located in the machine shop, where it is possible to supervise the tools and machinery on the entire floor.

The Magneto Department

A small section of the machine shop is given over to the magneto department. Here some of the sub-assemblies of the magneto are made preparatory to the general assembly processes. Another part of the machine shop is taken up by the tool room, which extends along the inside wall.

Parts leaving the machine shop pass to the assembly shop, where the transmission units are put together in one part and the engine units in another, the two coming together at the final assembly nearest the shipping platforms. This assembly work eventually will be done on a sort of carrier or belt system, the same as is in use in large motor car factories. At the present time the carriers used are simply wheel trays which run on rollers inside of the two channel beams which are arranged parallel to each other in the form of a track. Thus the production travels a sort of semi-circular path, starting at the foundry and stockroom, passing around through the machine shop and out the assembly shop to the loading platform, or dock.

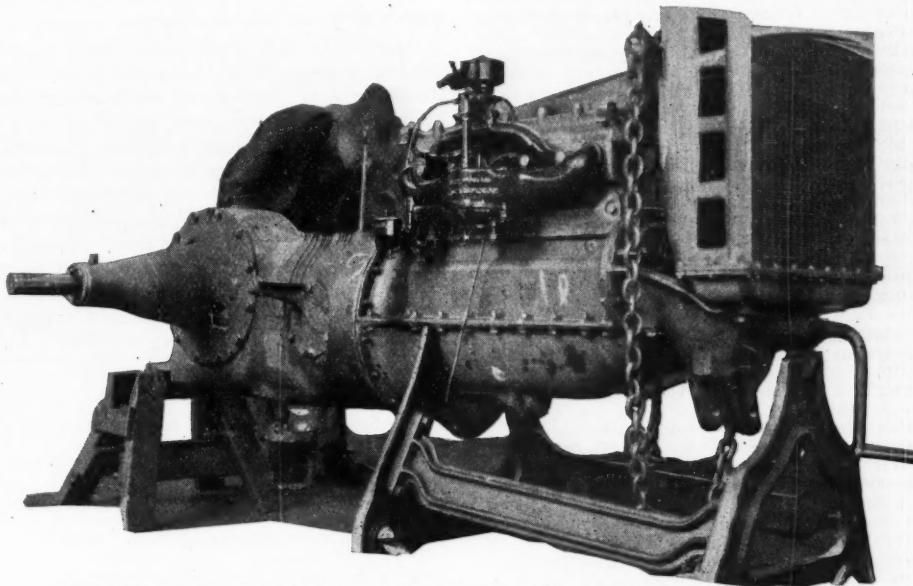
Several miscellaneous departments have been placed in close proximity to the other plants. For instance, the heat treating room is next to the productive stockroom. The heat-treating furnaces and carbonizing furnaces are arranged along opposite walls, allowing the work to be fed into them from the center. The same method is used in

connection with the babbetting and blacksmith shop, which are on the side wall, allowing the material to be fed from the open space in the center of the room. A special room is used for magneto heat treatings.

The pattern shop at present is located adjacent to the assembly shop but probably will be changed shortly. Both metal

and wood patterns are taken care of in the one department.

A new section is being added to the power house. A large gas producer has been installed, and the wheels are being put up around the producer which is already in position. This will complete the power house to take care of production.



Final assembly of the tractor. This is just about ready to receive its wheels



Bay between two buildings now occupied by production stock but to be roofed



The tractors haul building materials through mud roads impassable for an ordinary truck

Contracts Placed by Signal Corps

Holders of War Orders Entered Into by Army Branch Up to March 18, 1918

Ackerman Wheel Co., Cleveland—Landing gears.
 Acklin Stamping Co., Toledo—Handley-Page samples.
 Aeronautical Engine Corp., Long Island City—Engines.
 Aero Accessories Mfg. Co., Brooklyn—Turnbuckles.
 Ahnapee Veneer & Seating Co., Algona, Wis.—Panels.
 Aluminum Co. of America, Washington—Tubing.
 American Chain Co., Inc., Bridgeport—Cotter pins.
 American Metal Hose Co., Waterbury—Tubing.
 American Optical Co., Southbridge, Mass.—Goggles.
 American Propeller & Mfg. Co., Baltimore—Propellers.
 American Rattan & Reed Mfg. Co.—Brooklyn—Rattan.
 American Screw Co., Providence—Screws.
 American Steel & Wire Co., Washington—Wire.
 American Wood Reduction Co., Chicago—Acetate lime.
 Barber & Ross, Washington—Propellers.
 Barcale Mfg. Co., Buffalo—Belt buckles.
 Bastian Blessing Co., Chicago—Hydrogen valves.
 Belden Mfg. Co., Chicago—Wire.
 Berry Brothers, Inc., Detroit—Spar varnish.
 Bickwell-Thomas Co., Greenfield, Mass.—Instruments.
 Bosch Magneto Co., N. Y. City—Magnetics.

Airplanes

Breeze Aircraft Co., Inc., Farmingdale, L. I.—Airplanes.
 Sidney S. Breeze, N. Y. City—Airplanes.
 British Thomson-Houston Co., London, England—Magnets.
 Buffalo Forge Co., Buffalo—Armatures.
 Burd High Compression Ring Co., Rockford, Ill.—Piston rings.
 Burdett Oxygen Co., Chester, Pa.—Hydrogen.
 Bureau of Mines, Washington—Services.
 Burgess Co., Marblehead, Mass.—Hydroairplane and engines.
 Burns & Bassick, Bridgeport—Hanley-Page samples.
 Albert E. Burr Co., New York City—Cotton fabric.
 California Aviation Co., Los Angeles—Airplane spares.
 Canadian Aeroplane Co., Toronto, Canada—Airplanes.
 Carnie-Golden Mfg. Co., Kansas City, Kan.—Hangars.
 Cavanaugh & McGee Co., N. Y. City—Instruments.
 Chamberlain Cartridge & Target Co., Findlay, Ohio—Clay pigeons.
 Champion Spark Plug Co., Toledo—Spark plugs.
 Chickasaw Lumber Co., Demopolis, Ala.—Lumber.
 Chief of Engineers, Washington—Electric primers.
 Chief of Ordnance, Washington—Smoke bomb outfit.
 A. C. Clark Co., Chicago—Oxygen apparatus.
 Columbia Rope Co., Auburn—Rope.
 Controller Aeronautical Supply Co., London, England—Axle tubes.
 Connecticut Aircraft Co., New Haven—Balloons.
 Dayton Metal Products Co., Dayton—Services.
 Dayton-Wright Aeroplane Co., Dayton—Aeroplanes.
 Department Agriculture, Forestry Service, Washington—Lumber.
 Des Moines Sawmill Co., Des Moines—Lumber.
 Eugene Dietzen Co., New York City—Instruments.
 Doehler Die-Casting Co., Brooklyn, N. Y.—Airplane and engine parts.

IN VIEW of the conflicting reports in regard to the work done toward obtaining a large fleet of airplanes for the United States the list of contracts made by the Signal Corps and published herewith is of more than ordinary interest. Elsewhere in this issue is given the tenor of the report made by the Snowden Marshall investigating committee, which was appointed by President Wilson recently. From week to week MOTOR AGE will publish authentic accounts of the situation as it really is. The list of contracts entered into by the Signal Corps up to March 18, 1918, follows:

Duesenberg Motors Corp., New York City—Engines.
 Eastman Kodak Co., Rochester—Cellulose acetate—Cameras.
 Electric Magneto Tool Co., Chicago—Gun stems.
 Electric Metallurgical Sales Corp., New York City—Ferrosilicon.
 Empire Art Metal Co., College Point, N. Y.—Airplanes.
 Empire Axle Co., Dunkirk, N. Y.—Propeller hubs.
 Engle Aircraft Co., Niles, Ohio—Airplane spares.
 Ericsson Mfg. Co., Buffalo—Miscellaneous engine parts.
 Erie Specialty Co., New York City—Airplane parts.
 Excelsior Motor Mfg. & Supply Co., Chicago—Engines.
 Firestone Tire & Rubber Co., Washington—Tires.
 Fisher Body Corp., Detroit—Airplanes.
 Fitzgerald Mfg. Co., Torrington, Conn.—Engine parts.
 Flottorp Mfg. Co., Chicago—Propellers.
 Follman-Clegg & Co., Lancaster, Pa.—Parachutes.
 Foote-Pierson Co., New York City—Wind vanes.
 Ford Motor Co., Detroit—Engines-cylinders.
 Fowler Aeroplane Corp., San Francisco—Airplanes.
 T. C. Foxboro Co., Inc., New York City—Indicators.
 French-American Balloon Co., St. Louis—Balloons.
 Julien P. Friez & Sons, Baltimore—Instruments.
 Gallaudet Aircraft Corp., East Greenwich, R. I.—Hydro-airplanes.
 Garden City Furniture Co., Chicago.
 General Electric Co., Schenectady—Instruments.
 General Motors Co., Detroit—Engines.
 General Vehicle Co., Long Island City, N. Y.—Real estate—plant.
 B. F. Goodrich Rubber Co., Akron—Balloons.
 Goodyear Tire & Rubber Co., Akron—Balloons.
 Grand Rapids Chair Co., Grand Rapids—Oak.
 Henry J. Green, Brooklyn—Instruments.
 Hall Scott Motor Co., Inc., San Francisco—Engines and spares.
 H. E. Harris Engineering Co., Bridgeport—Gauges.
 Harrisburg Pipe & Pine Bending Co., Harrisburg, Pa.—Hydro-cylinders.
 Hartzell Walnut Propeller Co., Piqua, Ohio—Propellers.
 Hartzell Walnut Sales Co., New York City—Propellers.
 Haskell Mfg. Co., Ludington, Mich.—Lumber.
 A. L. Haustitter, New York City—Instruments.
 Hayes-Iania Co., Grand Rapids—Airplane spares.
 Fred G. Hays & Co., Washington—Instruments.

Healy Tool & Appliance Co., Buffalo—Reseaters—Valves.
 Heinze Electro Co., Lowell, Mass.—Magnetics.
 McQuay-Norris Mfg. Co., Washington—Piston rings.
 Morse Chain Co., Ithaca—Tracings and prints.
 Roberts Brass Mfg. Co., Detroit—Elbows.
 Pittsburgh Model Eng. Co., Pittsburgh—Engine spares.
 Peninsular Milled Screw Co., Detroit—Hex nuts.
 Lawrence Aero Eng. Corp., New York City—Engines.
 Raymond Mfg. Co., Corry, Pa.—Springs.
 Jackson Motor Shaft Co., Jackson, Mich.—Camshafts.
 Lavigne Mfg. Co., Detroit—Drawings.
 Lewis & Vought Corp., Long Island, N. Y.—Airplanes.
 Riker, New York City—Caustic soda.
 U. S. Gauge Co., New York City—Gauges.
 Nicholas & Cox Lumber Co., Grand Rapids—Lumber.
 Norwood Lumber Co., Forney, N. C.—Lumber.
 Improved Equipment Co., New York City—Sil. hydrogen gen.
 Kraemer & Co., New York City—Lumber.
 Martin-Rockwell Corp., New Haven—Gears.
 Geo. H. McFadden & Bros., Philadelphia—Cotton.
 John A. Roebling's Sons, Trenton—Wire.
 John Boyle & Co., New York City—Ground cloths.
 Pittsburgh Reinforced Brazing Mch. Co., Pittsburgh—Chemicals.
 Pennsylvania Salt Co., Philadelphia—Chemicals.
 McKinnon-Dash Co., Buffalo—Sand bags.
 Russell Mfg. Co., Middleton—Shock absorber cord.
 Ingersoll Rand Co., New York City—Air compressor and tank.
 International Oxygen Co., New York City—Hydrogen.
 Queen-Gray Co., Philadelphia—Instruments.

More Airplanes

Thomas-Morse Aircraft, Ithaca—Airplanes and spares.
 Keuffel & Esser Co., Hoboken—Instruments.
 Glenn L. Martin, Cleveland—Airplanes.
 Taylor Inst. Co., Rochester—Instruments.
 Murray & Tregurtha, South Boston, Mass.—Sea sleds.
 L. W. F. Eng. Corp., College Point, L. I.—Airplanes.
 James V. Martin Aero Co., Elyria, Ohio—Airplanes.
 N. Y. Aero. Constr. Co.—Airplanes.
 Nat'l Electrical Sup. Co., Washington—Wire pikes.
 I. T. Mann, New York City.
 Pigeon Frazer, Boston—Model body.
 Nelson Blower & Ferru Co.—Instruments.
 Nordyke-Marmon Co., Indianapolis—Engines.
 Lang Prop. Co., New York City—Engine and airplane parts.
 Mass. Inst. or Tech., Cambridge—Services.
 Precision Inst. Co., Detroit—Air speed indicators.
 Lincoln Motor Corp., Detroit—Engines.
 Ordnance Dept.—Ammunition.
 Ordnance and Inst. Sect.—Mach. guns.
 Ruby Co., Cleveland—Airplane spares.
 Lewis-Thompson Co., Philadelphia—Mahogany logs.
 Norman W. Henly Publishing Co., New York City—Charts.
 Henrix, Luebert & Co., San Francisco—Hangars, tents.
 Hercules Powder Co., Wilmington, Del.—Dynamo.
 Herz & Co., New York City—Grip rings.
 The Hess Bright Mfg. Co., Philadelphia—Ball bearings.
 Hettrick Manufacturing Co., Toledo—Ground cloths.

Hooker Electrical Chemical Co., New York City—Soda.
 The Hughes Owens Co., Ltd., Montreal, Canada—Instruments.
 U. T. Hungerford Brass & Copper Co., New York City—Rivets.
 Edward W. Hunt, Guatemala, C. A.—Mahogany.
 E. G. Budd Mfg. Co., Philadelphia—Handley page sample.
 Federal Adding Machine Co., New Haven—Handley-Page sample.
 Stewart-Hartshorn Co., East Newark, N. J.
 W. E. & L. E. Curley & Co., Troy—Instruments.
 Curtis Screw Works, Buffalo—Screws.
 Detroit Sulphite Pulp & Paper Co., Detroit—Gaskets.
 Champion Ignition Co., Flint—Spark plugs.
 Corbin Screw Co., New Britain, Conn.—Screws.
 Chas. A. Bigelow, Bay City—Lumber.
 Burdett Mfg. Company, Philadelphia—Oxygen.
 Metz Company, Waltham, Mass.—Airplane spares.
 W. H. Mullins Co., Salem, Ohio—Airplane spares.
 Tenn. Valley Iron & R. R. Co., Pittsburgh—Acetate lime and alcohol.
 K. Kaufman & Co., Newark, N. J.—Instruments.
 W. H. Gear, Philadelphia.
 The Precision Casting Co., Syracuse—Venturi tubes.
 Radium Luminous Material Corp., New York City—Dials and pointers.
 Radium Dial Co., Pittsburgh—Dials and pointers.
 Turney, Halsey Co., New York City—Duck No. 8.
 Lawton Mills Co., New York City—Bal. cloth.
 International Register Co., Chicago—Wind vane sights.
 Imperial Furniture Co., Grand Rapids—Oak.
 Loening Aeronautical Eng. Corp., Long Island City—Airplanes.
 Reddis Lumber & Veneer Co., Marshfield, Wis.—Panels.
 Talge Mahogany Co., Indianapolis—Panels for spad planes.
 Frederick Pearce Co., New York City—Scarf mounts.
 The Parkersburg Mill Co., Parkersburg—Poplar.
 Peierl Buhler Co., New York City—Fabric.

Instruments

King Inst. Co., New York City—Instruments.
 U. S. Industrial Chemical Co., Baltimore—Acetone.
 Mulconroy Co., Philadelphia—Braided hose.
 Macey Engineering Co., Franklin, Pa.—Elec. control.
 Union Switch & Signal Co., Swissvale, Pa.—Engines.
 Fritz Lowenstein, Brooklyn—Spark gap.
 National Tube Co., Pittsburgh—Hydrogen cylinders.
 Ponemah Mills, New York City—Airplane fabric.
 Lortex Co., New York City—Fabric.
 Pierce Mfg. Co., New Bedford, Mass.—Airplane fabric.
 Nat'l Cash Register Co., Dayton—Tachometers.
 Pittsburgh Test Lab's, Pittsburgh—Services.
 National Lumber & Mfg. Co., Hoquiam, Wash.—Lumber.
 Nehalem Saw Mill & Box Factory, Nehalem, Ore.—Lumber.
 Prouty Lumber & Box Co., Seaside, Ore.—Lumber.
 Oregon Box Mfg. Co., Portland, Ore.—Lumber.
 Mineral Lake Lumber Co., South Bend, Wash.—Lumber.
 Harrison Mills Co., Bellingham, Wash.—Lumber.
 Pigeon Frazer H. S. Co., Boston—Airplanes.
 Thomas Morse Aircraft, Ithaca—Airplanes.
 Glenn L. Martin, Cleveland—Airplanes.
 W. R. Mathew & Son, New York City—Guy anchors.
 Russell Mfg. Co., Middletown, Conn.—Parachute harness.
 Oxygen Gas Co., Kansas City—Wire thimbles.
 McKeon Motor Car Co., Omaha—Windlass.
 Packard Motor Car Co., Detroit—Engines.
 U. S. Aircraft Corp., Redwood City, Cal.—Airplanes.

Newark Tube & Metal Co., Newark, N. J.—Handley-Page samples.
 U. S. Cartridge Co., Lowell, Mass.—Ammunition.
 Kessler Motor Co., Detroit—Engine parts.
 Lewis Spring & Axle Co., Chelsea, Mich.—Airplane spares.
 Pittsfield Spark Coil Co., Pittsfield, Mass.—Spark plugs.
 Murray & Tregurtha Co., South Boston—Seasleds.
 Rajah Auto Supply Co., Bloomington, N. J.—Terminals.
 Liberty Iron Works, Sacramento—Airplanes.
 G. E. Taylor, Rochester—Instruments.
 Riley Scott—Dummy bombs.
 Ordnance Mfg. Corp., New York City.
 Laminated Shim Co., New York City—Sheet brass.
 Lawrence Engine Corp.—Engines.
 The National Acme Co., Cleveland—Hex nuts.
 Pittsburgh Model Eng. Co., Pittsburgh—Engine spares.
 Rich Tool Co., Chicago—Engine parts.
 U. S. Ball Bearing Co., Chicago—Ball bearings.
 Tariffville Oxygen & Chem. Co., Tariffville, Conn.—Hydrogen.
 International Oxygen Co., New York City—Hydrogen.
 Lewis Mfg. Co., Walpole, Mass.—Cheese cloth.

W. H. LeBrun, Depot Co., Kan.—Protar lens.
 Torchweld Equipment Co., Chicago—Hose clamps.
 Metal Products Co., Detroit—Airplanes.
 Maddox Table Co., Jamestown, N. Y.—Propellers.
 International Register Co., Chicago—Wind vane sights.
 John A. Roebling's Sons Co., Trenton, N. J.—Wire.
 Western Paper Box Co., Detroit—Paper gas-kets.
 Westinghouse Electric & Mfg. Co., Pittsburgh—Telephones, supplies.
 Wm. Whitman & Co., Inc., New York City—Airplane fabric.
 William Test Clamp Co., Cleveland—Connectors.
 Wilson Foundry Co., Pontiac—Engines.
 Winchester Repeating Arms Co., New Haven—Ammunition.
 Wing & Evans, New York City—Caustic soda.
 Winkler & Bro. & Co., New York City—Caustic soda.
 Wolverine Brass Works, Grand Rapids—Scarf ring mounts.
 Wright-Martin Aircraft Corp., New York City—Airplanes, engines.
 Ypsilanti Reed Furniture Co., Ionia, Mich.—Balloon baskets.
 Zenith Carburetor Co., Detroit—Carburetors.
 Curtiss Aeroplane & Motor Corp., Buffalo—Airplanes and spares.

Cleveland Airplane Work

Martin Plant Nears Completion While City Prepares for Aerial Mail

CLEVELAND, Ohio, April 5—The 5-acre plant which is being completed for the Glenn L. Martin Airplane Co. rapidly is approaching completion, and it is expected that the Martin company will be in production in about sixty days. The formation of this company marked the entrance into the airplane industry of a concern which not only intends to build war products but which will probably be an important factor in the commercial airplane developments which will follow the war.

The concern is incorporated for \$2,000,000 and has erected its plant on a 55-acre field, which is sufficient not only to give plenty of room for expansion purposes of the factory but also to allow a land and experimental field for the planes manufactured. It is only in a few instances that airplane factories have been able to have flying accommodations in close proximity to the manufacturing plant.

Other airplane activities in Cleveland include the establishment of a committee headed by Alva Bradley, a wealthy Cleveland sportsman. Sites are now being selected for landing places which will be used when the Government decides to put Cleveland on the airplane postal service map.

The Signal Corps has established its airplane headquarters at Cleveland, largely due to the central location of that town, as from Cleveland it is an easy matter to keep in touch with Buffalo, Detroit and Dayton, at which points a large amount of the airplane production work is at present concentrated.

The labor situation in Cleveland from an airplane standpoint is satisfactory, and, according to the Cleveland board of commerce, there is always a surplus on the

weekly list. Probably 1200 laborers of the semi-skilled class are placed in positions each week by the board, and there is always an excess of from 300 to 400 who remain unplaced.

In addition to the manufacture of planes, there are nearly 150 manufacturers of trucks, passenger cars and parts in Cleveland, giving a nucleus from which readily can be drawn sources of supply for practically all airplane parts. A recent canvass of the parts situation resulted in the discovery that every part of a car is made in Cleveland with the exception of the steering wheel.

FIRST EAGLE IN JUNE

Washington, April 5—Henry Ford has assured Secretary of the Navy Josephus Daniels that the first of the Eagle boats, the new supersubmarine chasers, will be launched in June and that under stress it will be possible to turn out five a day. Under present plans Ford intends to launch one boat per day. Secretary Daniels recently visited the Detroit Ford plant and inspected the new first pattern boat.

R. F. C. BACK TO CANADA

Washington, April 5.—The British Royal Flying Corps at Fort Worth, Tex., which has been training in this country at the invitation of the Government, is returning to Canada. The three fields at Fort Worth will be devoted to training Americans. The situation whereby the Canadians trained in the United States was an unusual one and directly contrary to some well-established precedents but was carried on as a return courtesy for the British invitation last summer to Americans to train in Canada.



Electrical Equipment of the Motor Car -



By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the ninetieth installment of a weekly series of articles began in MOTOR AGE, issue of June 29, 1916, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., New York, in a size to fit the pocket conveniently.

Part XC—Heinze-Springfield System for Ford Cars Concluded

BORE a $\frac{3}{8}$ -inch in the floor or toe board 2 inches to the right of the coal box and 2 inches back from dash. Take off the outside bolt, where the manifold is connected to the carburetor. Place the free end of the large rod through the hole in the floor board. Fasten the hook of the small rod on the air gate lever and then secure the flat plate to the carburetor flange, with the small end pointing outward, by the bolt previously removed. The plate should be fastened on the side of the flange toward the back of the car and the large rod should come over the top of the plate as shown in Fig. 493.

Dash Switch and Horn

The dash switch, a front view of which is shown in Fig. 494, is designed to control cranking, lighting and ignition. It also embodies a mechanical cutout, which opens the circuit when the engine is stopped, preventing a discharge of the battery through the generator winding. The button in the center of the switch controls the cranking motor, and the switch rotates and makes the following connections: First, ignition on, lights off; second, ignition on, lights dim; third, ignition on, lights bright; fourth, ignition on, lights dim; fifth, all circuits open.

When the switch is in the position of lights dim, ignition off, or in the off position, the starting button is locked, and the remainder of the switch may be locked, to prevent cranking with the ignition off and also to prevent tampering. The switch must always be in an off position when the engine is stopped, otherwise the battery will discharge through the generator winding. The Ford ignition switch should be placed in the on position and allowed to remain so at all times. The cowl light is controlled by turning the lever on the side of the light itself. The dimming of the lights is accomplished by placing a resistance in series with the lamps.

The horn equipped on the Ford car is operated by alternating current supplied by the Ford magneto. This horn, however, may be used without interfering in any way with the Heinze-Springfield equipment, but it cannot be operated by the storage battery. The user, if desired, may install a direct-current horn, which can be operated from the battery and should be connected as shown in Figs. 491 and 492.

Place the spark and throttle levers in the usual starting position, and be sure the brake lever is in the proper position so the engine is not connected mechanically to the rear axle. Depress the starting button in the center of the combination switch, and the motor should start to revolve. The rotation of the motor armature will cause the Bendix drive pinion to be carried along the threaded shaft upon which it is mounted until it engages the teeth on the large driving gear in Fig. 490. After the pinion and gear are engaged the starting motor is connected mechanically to the engine and will cause the crankshaft to rotate. If the engine does not start in a few seconds, stop the starting motor and prime the cylinders, or the choking device may be used with the starting motor in operation. Should the engine still fail to start, investigate the cause, as otherwise the battery will be exhausted needlessly. Frequent discharging of the storage battery in this way very appreciably shortens its life.

When the switch is thrown to any "ignition on" position the ammeter should show a discharge of 14 to 20 amperes. As the engine begins to rotate the ammeter needle will swing toward the right, indicating that the generator is operating properly.

The ball bearings on which the armature of the generator rotates should be oiled with a light non-acid oil about every 400 miles. The motor armature rotates on two white metal bearings and these should be oiled at the same time the generator bearings are oiled. Be careful in oiling the bearings not to allow

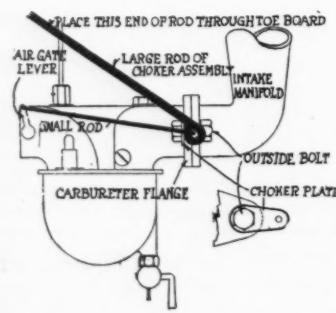


Fig. 493—Choker assembly for Heinze-Springfield installation on Ford car

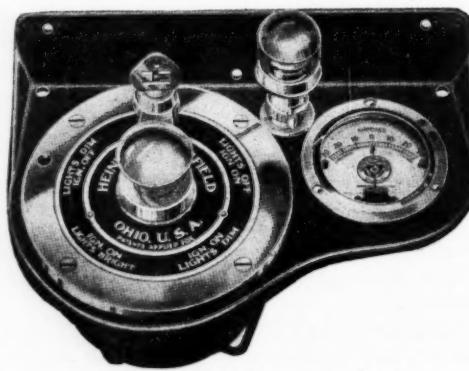


Fig. 494—Dash switch for Heinze-Springfield installation on Ford car

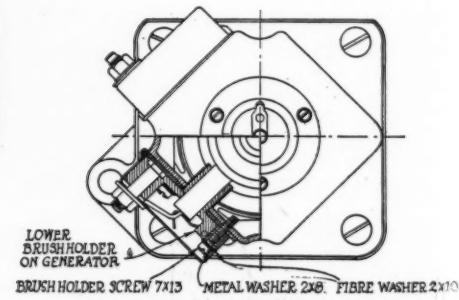


Fig. 495—Method of grounding one of the generator brushes

Fig. 496—Wiring diagram of Heinze-Springfield installation in Ford car. Generator equipped with electromagnetic regulation

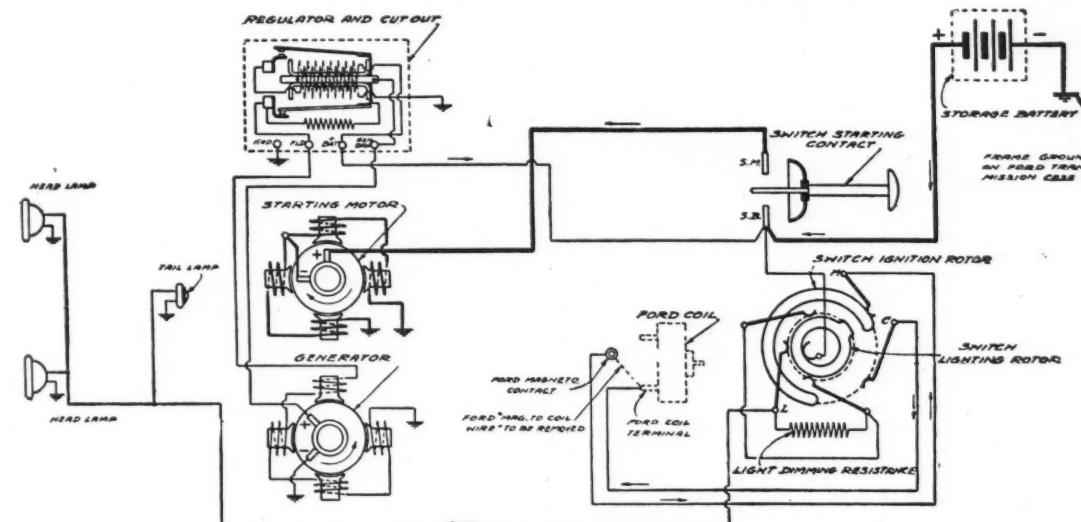
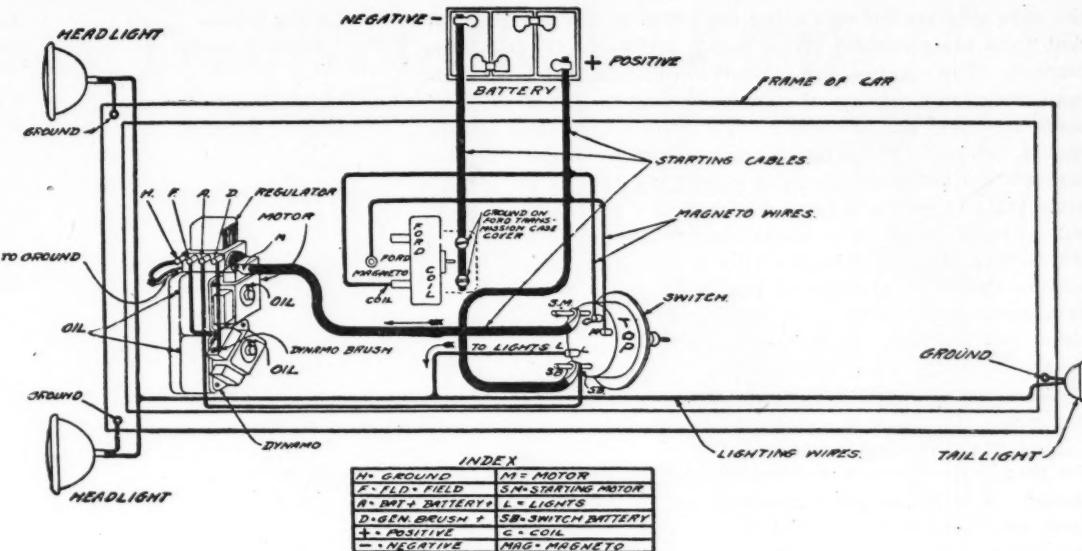


Fig. 497—Internal connections of Heinze-Springfield installation on Ford car. Generator equipped with electromagnetic regulation

any dirt to enter with the oil as this would cause the bearings to grind. The Bendix drive should never be oiled. All grease and dirt which may accumulate should be wiped off occasionally and the threads thoroughly cleaned with kerosene.

When the system first is installed the chain should be adjusted fairly tight, and the chain should be examined through the holes in the chain cover after the car has been run about 100 miles. The chain doubtless will be loose and should be tightened, and this inspection and adjustment repeated about every 300 or 400 miles. The chain may be tightened by first loosening the motor stiffening bracket at 25 x 4, Fig. 486, and also the upper and lower locking nuts, 20 x 13. By turning the fillister head cap screw, 25 x 1, which is mounted in the chain adjusting stud 829, tighten the chain to the proper tension and lock the unit in place by tightening the upper and lower locking nuts and the stiffening-bracket bolt.

Refill the storage battery about once a week, especially during the summer, with distilled water. Inspect the terminals occasionally and keep them thoroughly clean from any corrosion of any kind. Baking soda and water may be used in cleaning the terminals, as it will counteract the acid. Do not allow the battery to stand in a discharged condition, especially in cold weather, as it is very likely to freeze and burst or crack the containing jars.

Adjusting Generator Output

The regulation of the cutout of model 33 generator is accomplished by a reversed or differential series field. The magnetic action of this series-field winding opposes the magnetic

action of the shunt field winding and thus prevents the output increasing with increase of engine speed as rapidly as it would if this action were not present. Sometimes it is necessary to increase the output, or charging rate, and this can be done by shunting or by passing part of the current out of the series field winding and thus causing less magnetic opposition to the shunt field winding. One end of the series field is grounded, and the other end is connected to the lower brush holder on the generator, which is the bottom machine. By grounding the lower brush holder, both ends of the series field will be connected to the frame of the machine, permitting the greater part of the current to pass through the frame. The connections of the series-field winding are shown in Fig. 492.

The brush may be grounded as follows: Remove the brush cover and the brush screw, 7 x 13, Fig. 493, with the metal and fiber washers, 2 x 8, and 2 x 10, respectively. Now remove the fiber washer, 2 x 10, from the screw and replace the screw, 7 x 13, and metal washer, 2 x 8, screwing same down tightly. If all other conditions are normal the charging rate should be increased from 5 to 10 amperes.

The wiring diagram given in Fig. 496 shows a generator equipped with an electromagnetic cutout and having electromagnetic regulation. The internal connections of this system are shown in Fig. 497. If you are convinced that the trouble you are having is in the regulator its adjustment may be taken care of as follows: Connect a reliable ammeter in series with the ammeter installed on the cowl board to be used in checking. Looking at the regulator from the side on which the wires are connected to the terminals, the set of silver contact points on

the near side are for regulating the value of the charging current from the generator; these points are called the regulating contacts. The other set are the cutout contacts, which close and open the circuit between the generator and the battery. First, make sure that the two sets of contacts are clean and smooth; second, determine if the regulating contacts are closed. If these contacts are not closed, bend down slightly the ear on the thin brass plate to which the flat steel spring is attached. The cutout contacts should have enough spring tension to make them stand open when the engine is not running, and the spring tension should be so adjusted that when the engine is running at a speed equivalent to 7 or 8 miles per hour the contacts will close, and the ammeter should indicate a charge. If ammeter shows discharge when contacts close, it is an indication the contacts are closing too soon and the spring tension should be increased.

The regulator contacts are adjusted by bending the ear of the thin brass supporting plate to which the flat spring is attached. To increase the current output of the generator, bend down the thin brass plate, and to decrease the current bend the thin brass plate upward. In the majority of cases, if the regulator is so adjusted that 15 amperes is the greatest current the generator will deliver, satisfactory results will be obtained. In some extreme cases the rate may have to be increased to as much as 20 amperes.

Locating Troubles

Not Cranking

- Battery discharged
- Shorted cell
- Dirty or rusty Bendix
- Broken Bendix spring
- Short or open in fields
- Short or open in wiring
- Short or open in armature coils
- Short or open in commutator bars
- Short or open in connection
- Short or open in switch
- Weak springs
- Brushes burnt
- Brushes short
- Water or oil soaked
- Battery gravity low
- Loose or corroded terminals
- Cold weather
- High resistance at brush contacts
- Starting switch making poor contact
- Spring tension weak
- Brushes not fitted to commutator
- Pig tails loose

Cranks Slow

erable effort has been necessary to place contracts to cover the Navy's needs. The principal difficulties of this kind have been with steel and iron materials. With the assistance of the American Iron and Steel Institute the tonnage needed has been distributed among all mills having proper capacity and facilities.

In the case of some items, such as chain, the industry is being severely strained to get out the production needed, but there has been no actual shortage. Efforts are being made to secure new sources of supply.

In its purchases the Navy Department has steadfastly held to the principle of competitive buying, this method giving most satisfactory results to both seller and buyer.

Seaplanes

As the seaplane is an important means for attacking the submarine, special attention has been given to the development of

Lights Dim— Battery Low	{ Internal leakage External leakage
Lights Dim— Engine Running	{ No water in battery Battery sulphated
Flickering Lights	{ Generator inoperative Loose connections in wiring
Some Lamps Bright and Some Dim	{ Wrong voltage of lamps Poor ground—wire too small
Brushes	{ Poor ground Carbon dust—ground Binding or twisted Too short or twisted Not fitted to commutator Poor tension on springs Pig tails loose High resistance contacts
Field	{ Open Shorted Chaffed Loose connections Burnt out Poor ground Oil or water soaked
Ammeter shows no charge with engine running	{ Oil or grease on commutator High commutator bars Low commutator bars Shorted commutator bars Poor soldering of bars Shorted coils Open coils Armature rubbing poles
Armature	{ Generator lead grounded Positive brush grounded Brushes not seated on commutator
Low Amps.	{ Generator lead grounded Positive brush grounded Brushes not seated on commutator

These suggestions apply to the model 33 generator with a bucking field regulation. If the type of generator having electromagnetic regulation is used, the following suggestions should be observed in addition to the above: Inspect the cutout to see that it opens and closes the circuit at the proper time so that the battery immediately starts to charge as soon as the circuit closes and the rate of discharge just before the cutout opens should not exceed two amperes. The regulator should be inspected occasionally to see that its contacts are clean and that the battery is being charged at the proper rate.

A YEAR AT WAR

(Concluded from page 19)

building. The first machine turned out by this factory was completed March 1. Additional machines will follow in rapidly increasing numbers until about June 1 it is expected to turn out at least one complete machine a day.

The outbreak of the war found the Navy well supplied with materials required for the then existing enlisted personnel and for the upkeep of the vessels of the fleet, a heavy demand having been anticipated.

With the rapid increase in enlisted personnel, the laying down of additional destroyers and small craft and the conversion of large numbers of merchant vessels, extensive additional purchases of all kinds of supplies, materials and munitions were necessary. The demands for such additional materials have been met successfully.

In the case of certain materials, consid-

erable effort has been necessary to place contracts to cover the Navy's needs. The principal difficulties of this kind have been with steel and iron materials. With the assistance of the American Iron and Steel Institute the tonnage needed has been distributed among all mills having proper capacity and facilities.

Aircraft bombs designed to explode either on impact, if they hit a submarine, or at a predetermined depth, like the ordinary depth charge, have been developed and the required quantities are being made. Sights for their accurate aim and improved seaplane cameras have accompanied them.

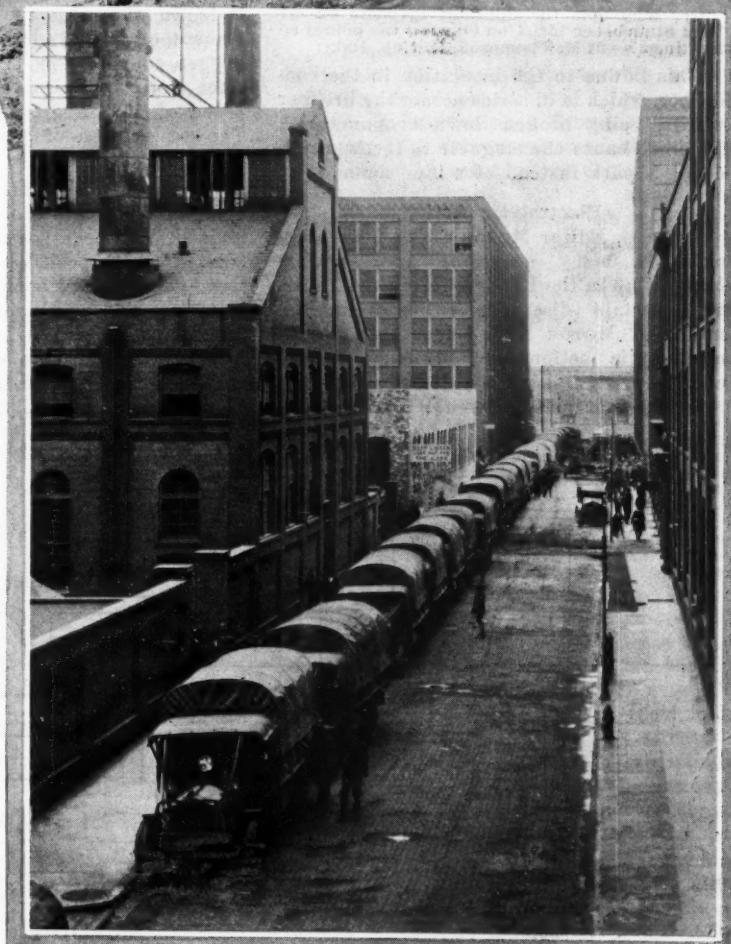
ANDERSON LIGHTS ON TRUCKS

Chicago, April 8—Equipment for 500 of the war trucks in use for the Signal Corps was shipped during last week by the Anderson Electric Specialty Co., maker of the Autoreelite. This light is a combination dirigible windshield searchlight with an automatic reel extension trouble light, which makes it possible to carry the lamp to any part of the car for inspection.

Ninety Trucks of Rubber Goods



*O*N this page are shown sections of the ninety-truck motor transport convoy that recently was driven from Detroit to the plant of the B. F. Goodrich Rubber Co., Akron, Ohio, for a cargo of solid tires and inner tubes and then proceeded to the Atlantic seaboard. The convoy is said to have broken all records for size and speed. Capt. Bert Jones, shown at left, commanded the convoy. The two upper pictures show sections on the Akron-Cleveland road, and at right the trucks are lined up at the Goodrich plant for their cargo.



The Readers' Clearing House

The Electric System

Wiring of 1917 Paterson

Q.—Give diagram of Delco wiring system as on 1917 Paterson.—E. Dahl, Storm Lake, Iowa.

This diagram is shown in Fig. 5.

Wiring of 1915 Pullman

Q.—Give diagram of Apleco starting and lighting system used on 1915 Pullman.—S. V. Gragg, Wichita, Kan.

This is shown in Fig. 1.

Wiring of Matchless System

Q.—Publish a diagram of electric wiring of the Matchless system. This outfit was taken off a Mitchell six.—Ralph F. Sweet, Buda, Ill.

A diagram of this system, which later on was called the Esterline, is shown in Fig. 4.

Wiring of 1915 Hupmobile

Q.—Publish a complete wiring diagram of Hupmobile model K 1915.—William Brinkop, St. Louis, Mo.

A wiring diagram of the complete starting and lighting system of the 1915 Hupmobile is shown in Fig. 2.

Wiring of Marion

Q.—Give diagram of starting and lighting system on the Marion motor car.—E. Owens, Milton, W. Va.

A wiring diagram of the Marion starting and lighting system is shown in Fig. 3.

Magneto Points Burn

Q.—Why does the Splitdorf magneto on my 1912 Studebaker insist on burning the points on the timer?—A. H. Thompson, Marion, Ind.

This is due to the insulation in the condenser, which is in series across the breaker points, being broken down or punctured. This will cause the magneto to throw a red-colored spark instead of a blue flame.

Electrolytic Action

Chicago, Editor MOTOR AGE—I have noticed in many questions and answers brought up in the Readers' Clearing House, that certain discrepancies exist in the minds of MOTOR AGE readers concerning electrolytic action and ordinary voltaic cells.

In the first place, I would like to bring

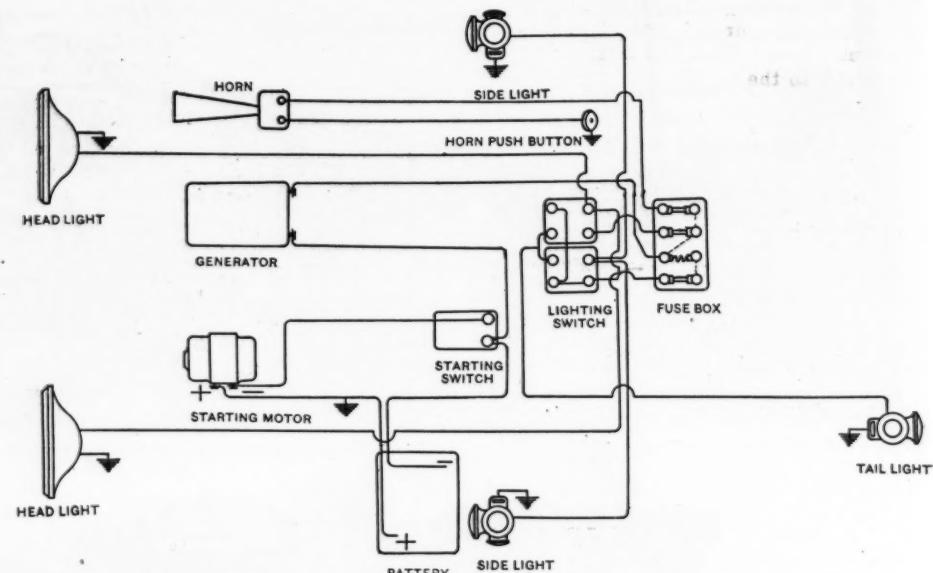


Fig. 2—Wiring diagram of 1915 Hupmobile, showing connections between the various units

to your attention the case of determining the polarity of direct current leads. We were told by certain readers that the lead from which bubbles of oxygen appear when both ends are dipped in water is the negative end. This statement is not correct, for it is not oxygen but hydrogen that collects on the negative terminal and the amount of H_2 is twice that, by volume, of oxygen collecting on the positive terminal, since water by volumetric analysis is composed of 66% hydrogen and 33% oxygen. The explanation of the electrolytic action is as follows:

The lead entering the water is positively charged and since the water, not pure, is ionized, the negative oxygen will be attracted by the positive plate, and the positive hydrogen will be brought to the negative plate and be liberated there. This action is not direct, as I have outlined, due to the fact that pure distilled water will not ionize or conduct the electric current. To make it an electrolyte an acid, base, or

salt must be added, and then let us suppose that sulphuric acid is added. The solution ionizes immediately and upon the passage of current through the electrolyte, the negative plate attracts the H_+ from the ionized H_2SO_4 , and the positive plate attempts to draw the SO_4^{2-} ion, but the SO_4^{2-} replaces the oxygen in the water forming H_2SO_4 again and liberating oxygen at the positive terminal. The amount of H_2SO_4 in the solution remains constant. This is the most convenient way of decomposing water electrolytically. The reason why it is not necessary to add an acid to ordinary water for the polarity test is that it contains already either acid or some other electrolytic chemical substance in solution. These statements are very elementary but are indeed the underlying principles of all electrolytic action and should be understood by all.—J. Mitnick.

Charging From Larger Battery

Q.—I have a Willard battery. How can it be charged from a 48-volt storage battery which I have? Show diagram.—G. B. D., Calgary, Alberta.

The connections for this are shown in Fig. 6. Insert a lamp bank in the circuit, so you can regulate the charge. The battery you want to charge has stamped on it the rate of charge, both at start and finish; this you can regulate by screwing in or out the lamps. Insert an ammeter in the circuit, making the connections as shown.

Electric System on Marathon

Q.—Give wiring diagram for a 1915 Marathon with Jones electric starter, Willard battery and Remy ignition. In what way is the small black button on the top of distributor box used?—R. N. Davis, Springfield, Ill.

MOTOR AGE has no wiring diagram showing the electrical installations on the Marathon car.

The small button you speak of is for timing the magneto to the engine. With this device the circuit breaker is brought into proper position, as well as locating the

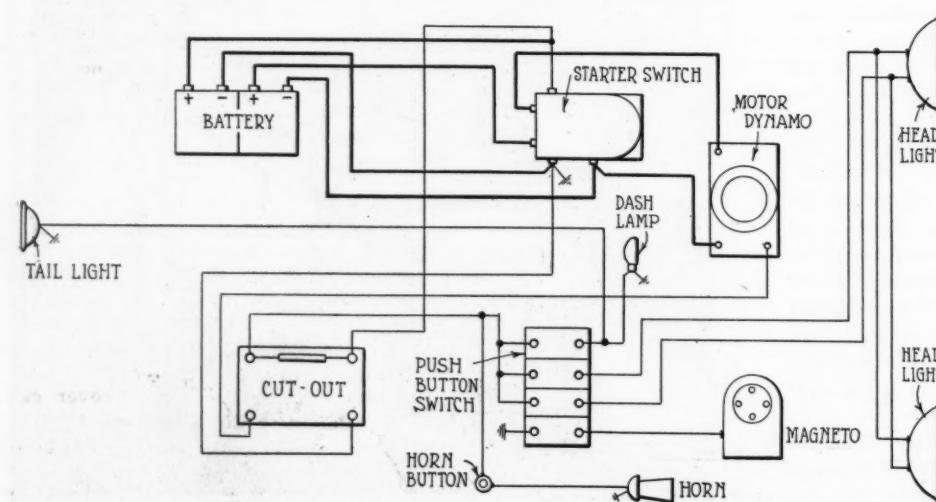


Fig. 1—Wiring diagram of Splitdorf-Apleco starting and lighting system on 1916 Pullman

proper spark plug cable terminal on the magneto. For timing the magneto turn the engine over by crank until No. 1 piston reaches top dead center on the compression stroke. Now press the timing button at the top of the distributor and turn the magneto shaft until the plunger of the timing button is felt to drop in the recess on the distributor gear. Then the instrument can be coupled to the engine.

Miscellaneous

Oxy-Acetylene Welding

Q.—Give information about oxygen welding; the different metals used in building up and the fluxes used.—A. Levett, Topeka, Kan.

Aluminum, iron, steel, copper, brass, platinum and other metals can be united with the oxy-acetylene flame. By this process welds are made by directing the oxy-acetylene flame on the parts to be welded at the place where they are to be joined. The flame is applied until the metal is molten and then additional metal of the same character. The latter comes in the form of wire or sticks, of suitable dimensions. Thus when welding an aluminum crankcase, a piece of aluminum wire would be used to supply the additional metal.

Distinction between brazing and welding must be made. A brazed joint is one in which a new metal having certain adhesive qualities is used as a binder. It adheres to the parts to be joined, but does not fuse with them, as its melting point is much lower. Welding is a process by which metal parts are joined together through being fused into a solid piece of the same structure and character. The oxy-acetylene blow pipe generally is used for welding broken parts or building up worn parts with metal.

The portable welding outfit, used mostly in small shops, consists generally of a tank

To assist readers in obtaining as a unit all information contained in this department on a certain subject in which they may be most interested, such as ignition, carburetion, etc., MOTOR AGE has segregated inquiries into classes of allied nature. Questions pertaining to engines will be answered under that head, and so on.

THE ELECTRIC SYSTEM

E. Dahl.....	Storm Lake, Iowa
S. V. Gragg.....	Wichita, Kan.
Ralph F. Sweet.....	Buda, Ill.
William Brinkop.....	St. Louis, Mo.
E. Owens.....	Milton, W. Va.
A. H. Thompson.....	Marion, Ind.
J. Mitnick.....	Chicago
G. B. D.....	Calgary, Alberta
R. N. Davis.....	Springfield, Ill.

MISCELLANEOUS

A. Levett.....	Topeka, Kan.
P. K. Owen.....	Grandfield, Okla.
Theodore F. Poetz.....	New York
J. A. P.....	Kiowa, Kan.
D. C. Canfield.....	East Canaan, Conn.
Reader.....	New Carlisle, Ohio
C. E. Benjamin.....	Ashton, Iowa
F. M. Newman.....	Brady, Tex.
M. C. Truxel.....	Johnstown, Pa.
H. J. Bethman.....	Kansas City, Mo.
B. R. Harrington.....	Oklahoma City, Okla.
C. C. D.....	Chicago

ENGINES

R. N. Ford.....	Williamstown, Mo.
A. G. Larson.....	Grinnell, Iowa
E. Hamilton.....	San Jose, Cal.
W. L. Skinner.....	Miller, Ala.
R. N. Davis.....	Springfield, Ill.
C. S. Sorensen.....	Chicago
R. M. Marlow.....	St. Louis, Mo.
R. H. Bunker.....	Upland, Neb.

REBUILDING

Carson Brown.....	New Canton, Ill.
Harry A. Vollmer.....	Bokoshe, Okla.
Reader.....	Bloomington, Ill.

CARBURETION

S. V. Gragg.....	Wichita, Kan.
Subscriber.....	Rock Island, Ill.

No communication not signed by the writer's name and address will be answered in these columns.

of oxygen, gas generator, in which the acetylene has been compressed, and the blow pipe. Sometimes there is included a special iron table with brick top. The portable outfit can be put in the rear of a car and taken to the scene of repair, often saving dismantling the engine or whatever

part of the car may be broken. Large pieces like cylinders and crankcases should always be preheated evenly before welding and cooled slowly after the job is finished.

Large Radiator for Ford

Q.—I have a truck attachment on a Ford. I find I haven't enough cooling capacity, or at any rate the engine gets very hot on a long run with a load. What would be the best way to keep it cool? I had thought a larger radiator, so that I could carry more water, would be best. Where can I find the largest radiator made to fit the Ford?—P. K. Owen, Grandfield, Okla.

Radiators with increased water capacity can be secured from the Detroit Radiator & Specialty Co., Detroit.

Regal Gear Adjustment

Q.—Explain how to adjust the drive pinion on a Regal so as to mesh properly with the ring gear.—Theodore F. Poetz, New York.

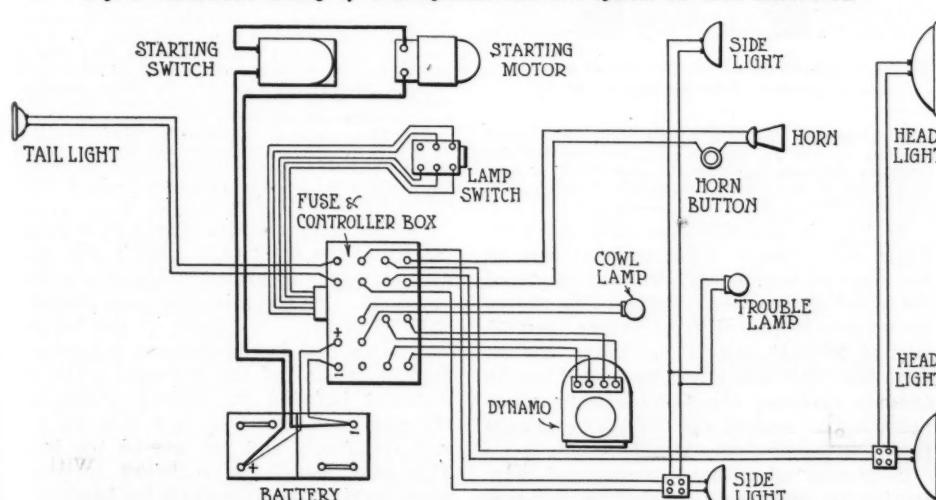
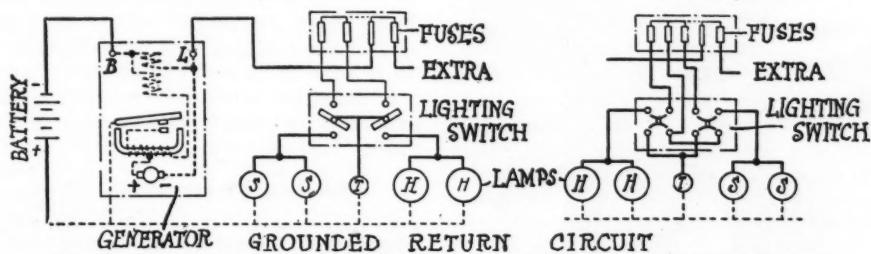
The drive pinion can be moved forward or backward by screwing to the right or left the threaded sleeve which contains the roller and thrust bearing in the casting at the rear end of the propeller tube. This threaded sleeve is held from turning by the small plate fastened to the casting directly over the bearing. The plate has a long tongue or projection which extends down and engages with a notch in the end of the threaded sleeve. The latter is notched all the way around thus permitting the proper adjustment to be made. When the locking device is removed the sleeve can be rotated with a punch or screwdriver. Turning it to the right will bring the pinion into closer mesh with the ring gear and vice versa. Either too tight or loose an adjustment will cause them to grind. The ends of the teeth on both pinion and gear should be practically flush when the gears are properly meshed. After adjusting replace the locking mechanism.

If you have to change the position of the ring gear to get proper meshing of the gears, proceed as follows: The cups or sleeves in which the differential bearings are contained are threaded on the outside and rest in corresponding threads in the differential supports and in the bearing caps. By slightly loosening the nuts which hold the caps in place, the threaded bearing sleeves can be turned to the right or left, as may be required. After this replace the caps and tighten the nuts, putting cotter pins in also.

Oil Leaks Into Clutch

Q.—Illustrate the method that will completely stop the oil in the crankcase from working into the clutch compartment on a 1917 King. The oil dam in the lower half of the crankcase housing which partitions off the clutch compartment is oil-tight; also the rear crankshaft bearing is in perfect shape and does not let oil into the clutch compartment. The Borg & Beck clutch will not work in oil and if the plug is left out of the clutch housing the car uses an excessive amount of oil.—J. A. P., Kiowa, Kan.

It is possible that at some previous time the oil pan may have been filled above the high level and the oil has flooded the flywheel case, finally working its way into the clutch and saturating the friction rings. Small quantities of oil will not affect the operation of the clutch, but a large quantity causes slipping that cannot be overcome in any other way than by removing the oil pan and loosening the clutch cover cap screws sufficiently to afford an opening around the flywheel, wide enough to allow complete draining of excess oil. Do not unscrew the screws more than $\frac{1}{16}$ in. After draining the clutch case and tightening



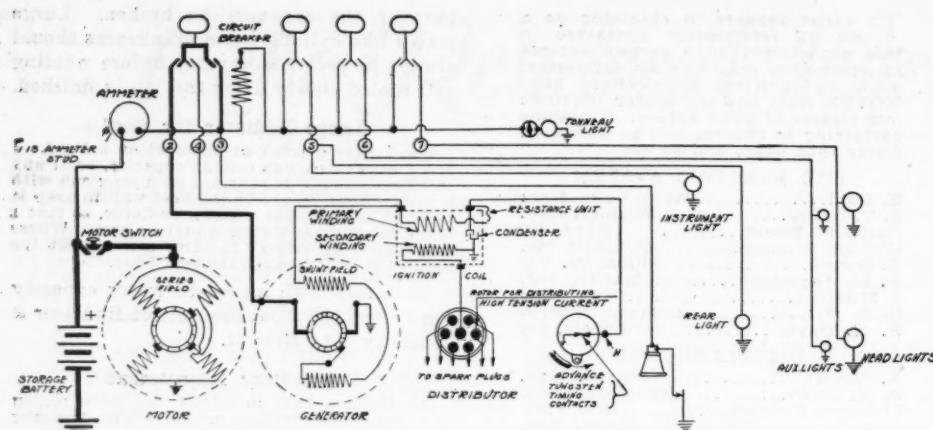


Fig. 5—Wiring diagram of the Delco system used on the 1917 Paterson

down the cover and replacing oil pan, the clutch may continue to slip for awhile.

If the clutch operates satisfactorily for a short while but after a little driving starts to slip again, remove the drain plug as before, and should there be a great amount of oil in the case, it shows that there is a leak in the dam that separates the front oil reservoir from the flywheel case. In a case of this kind the pan should be removed and the leak located, after which it must be soldered.

Naphthalene as a Fuel

Q.—What is naphthalene and what effect will this substance have on the running of an engine when added to the gasoline? Will it injure the engine in any way? I wish to try out a gasoline intensifier which I think is composed largely of naphthalene, but have hesitated to do so for fear of injuring my engine.

2—Are so-called moth balls composed of naphthalene?—D. C. Canfield, East Canaan, Conn.

Naphthalene is a solid fuel and is a product of coal tar distillation. Its heat value is less than that of gasoline. It is being used in limited amounts as a fuel in England due to its being cheaper than petrol. On account of its high boiling point of about 420 deg. Fahr. it requires special apparatus to carburete it. Naphthalene would not make a very good intensifier because its heat value is less than the fuel that you are trying to increase.

2—Moth balls is a commercial form of naphthalene.

Adjusting Valves On Regal

Q.—How much space should there be on a Regal between the valve stem and the pushrod when properly adjusted?

2—I have trouble in keeping the belt that drives the fan and generator in place. It keeps continually slipping off the pulleys. Can you give me an idea as to how to fix this?—Theodore F. Poetz, New York.

1—The clearance between the tappet screw and valve stem should be from 0.003 to 0.004 in. when the engine is cold.

2—Tighten the belt by slightly loosening the two cap screws which fasten the fan bracket to the cylinder casting. Then swing the bracket up until the belt is sufficiently tight. Then lock the cap screws again. It may be that your belt has stretched so much that no more adjustment of the bracket is possible. In this case cut off some of the belt and proceed as in the preceding.

May Be Oil-Soaked Wires

Q.—When testing a Ford engine by holding down three vibrators at once, what will cause two or more cylinders to fire, not always holding the same three? If it is a short, where will it usually be located?

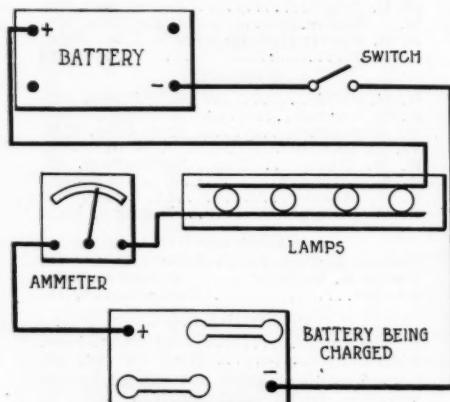


Fig. 6—Connections when charging one storage battery from another of higher voltage

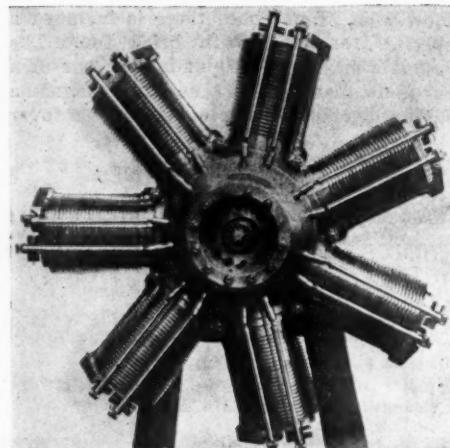


Fig. 7—Exterior of Clerget radial engine which develops between 50 and 60 hp.

2—Generally speaking of all cars, what must be done to run an engine with storage battery removed without injuring the generator or any other part of the electric system?—Reader, New Carlisle, Ohio.

1—This is probably due to a short between the primary wires and the case of the timer at one of the four connections at the timer case proper. This will be shown by what is apparently premature ignition similar to that caused by heavy carbon deposits. This also might be caused by the conduit carrying the four primary wires becoming oil soaked and thus have leakage from the one live wire to the others.

2—Nearly all outfits are rendered inoperative by removing a brush from the generator. The manufacturers' instruction

books usually specify what is to be done in case a battery fails while on the road.

Address of Doble Makers

Q.—Give address of manufacturers of Doble steam cars.—Reader, New Carlisle, Ohio.

This car is manufactured by the Doble-Detroit Co., Detroit.

Lowering Ford Frame

Q.—Advise how a Ford chassis may be lowered.—C. E. Benjamin, Ashton, Iowa.

A suggestion for lowering the Ford frame was published in the Readers' Clearing House, March 28.

Adding Oil to Gasoline

Q.—Some parties who are trying it say that it adds very greatly to the value of gasoline to add about 1 pt. of lubricating oil to each 10 gal. of gasoline. Is there any merit in this contention? Would adding the oil be a detriment in any way?—F. M. Newman, Brady, Tex.

This method is used quite commonly in lubricating two-cycle engines, especially those in marine service. The amount of oil used per gallon depends upon the size of the engine. However, for a motor car engine where a satisfactory lubricating system exists, there is no reason why this should be done.

Oil Gage on Crawford

Q.—Advise how I could put an oil gage on the dash of my car, which is a 1918-6-40 Crawford; also where I could get the gage and the cost of same. This car uses a Continental engine, TN.—M. C. Truxel, Johnstown, Pa.

The oiling of this engine is carried out in the following manner: Oil is drawn from the reservoir through a screen and forced through a tube to the timing gears. It then drains back into the oil pan, where a constant level is maintained in the dipper trough. To install a sight-feed gage on the dash, you would have to open the oil line between pump and timing gearcase and run your pipes as shown in Fig. 15. Thus all the oil pumped from the base will have to pass through the sight-feed gage.

Oil gages for this can be had from any of the supply houses and cost about \$1.50. These gages are usually of the flush type and require boring a hole in the instrument board with an expansive bit. If the board is of metal the hole can be cut with a small hand drill and the edges smoothed up with a file.

Replacing Broken Pinion Shaft

Q.—I have a Maxwell 25, on which the drive-shaft was broken. When taking the broken driveshaft off I found the pinion gear loose on the shaft and when replaced with new shaft I was unable to get this pinion gear on shaft without there being some side play. At the time I did not think it made much difference as it had the play on the old shaft. Should this play be taken out by making a new key to fit keyway in both shaft and pinion? Is there anything special to fit in replacing this shaft and drive back in differential?

2—Since making the repair there seems to be a knocking noise in universal joint. Would that be caused by not being tightened up enough when universal joint was replaced?—H. J. Bethmann, Kansas City, Mo.

1—The driving pinion should be attached rigidly to the shaft as in time it will wear the keyway and probably break the gear or shaft. To do this you will probably have to increase the width of the keyway or make a new key to account for the difference in size of the keyways. The adjustment between the driving pinion and the ring gear should be such that the two will roll freely and yet not be too loose. This play should be sufficient to notice when moving the driveshaft by hand.

2—This probably is caused by the gear

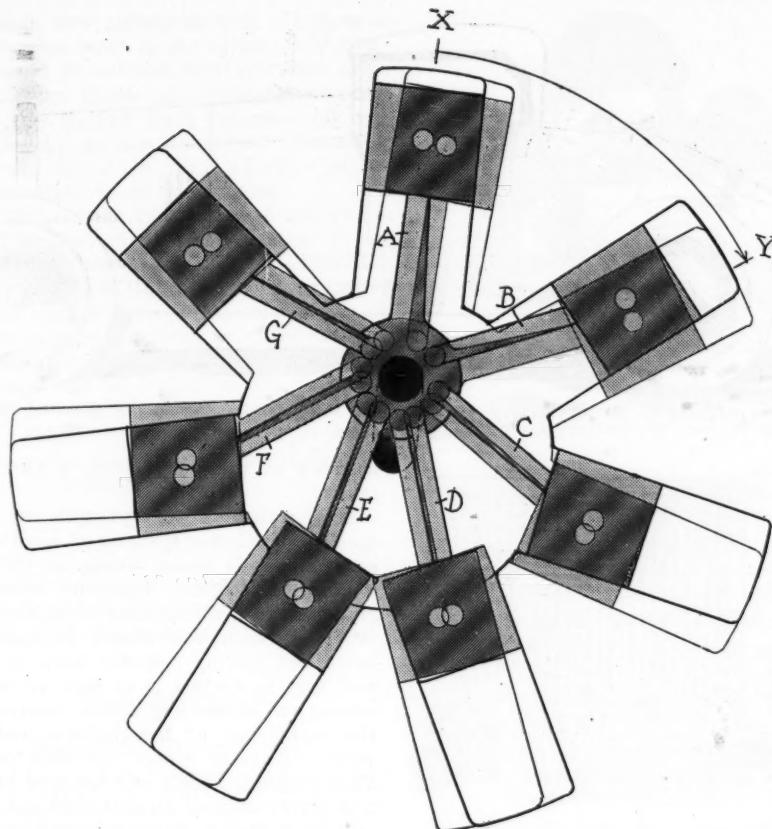


Fig. 8—Gnome seven-cylinder, showing connecting rods fastened to one throw of the crank

being loose on the shaft or due to the fact that too much play was left between the pinion and ring gear. These sounds from the rear axle easily are carried up the driving line and sometimes are very confusing as to their location.

Specifications of Doble Car

Q.—Give description of Doble steam car. How is freezing prevented? Give weight of boiler, also its construction, speed of car, how far one filling of water and oil will go, wheelbase, weight and spring suspension.—B. R. Harrington, Oklahoma City, Okla.

Alcohol may be added to the water in the boiler in winter to prevent freezing, the same as is done in gasoline cars using water for cooling. The Doble car has a condensing system whereby the alcohol is not wasted, it is said. Even if freezing should occur, the makers state that no damage can be done to the steam generator, as the steel tubing will expand without bursting.

The weight of the boiler and economizer sections is 450 lb. A cross-sectional view of the generator or boiler is shown in Fig. 11. It is of the water-tube type and carries a water level in the evaporating zone. There are twenty-eight identical sections, each consisting of two horizontal headers connected by sixteen vertical tubes, inclosed in an insulated casing. Eight of the sections are used as the economizer and the others for actual steam generation. The combustion chamber is directly beneath the steam generating sections, while the exhaust for burned gases is below the economizer sections. A plunger pump forces the incoming water simultaneously into the economizer sections through their lower headers. When they are full the water overflows into a manifold which delivers it into the lower headers of the evaporating sections. A by-

pass valve keeps the water about half way up in the generator.

As the water level rises the regulator tube is filled with water from an exposed pipe. This water, not being in circulation, is quite cool, so that the relatively large change in temperature causes the regulator tube to contract, thereby opening the bypass valve and allowing the water to return to the supply tank.

The economizer sections are partially shut off from the remainder of the generator by the bridge wall of Kieselguhr brick, a non-conductor of heat, which is virtually an extension of the rear wall of the combustion chamber. The hot gases rise from the combustion chamber and, giving up their heat to the closely grouped vertical tubes, pass over the bridge wall. The nor-

mal steam pressure in the boiler is 600 lb. Pressure is maintained at this point by an automatic device, which cuts off or renews the fuel supply according to the variation of the pressure from normal. The live steam is led from the upper headers into a manifold, passes through the throttle valve and down into the steam chest of the engine.

We have no record of the maximum speed.

The water tank holds 25 gal. and according to the company the car will travel upwards of 2500 miles on one filling. A gallon of oil is said to be sufficient for 5000 miles. An automatic oil pump is set to feed that amount of oil for the distance traveled. The oil is fed into the steam chest by this pump and passing through the steam lubricates the valve seats and cylinder walls. The oil in the crankcase keeps the crankshaft and bearings oiled.

The car has a wheelbase of 135 in., and the seven-passenger touring weighs, complete, 4100 lb. Semi-elliptic springs are fitted front and rear, the former being 44 by 2 in. and the latter 60 by 2½.

Adjusting Worn Steering Gear

Q.—Explain how to take up the play in steering wheel of Model 83 B Overland.—C. C. D., Chicago.

To correct wear or lost motion in this steering gear, first loosen the clamp bolt which clamps the steering column adjusting nut and turn the hexagonal adjusting nut, shown in Fig. 9, to the right until all up and down motion is taken up.

Now turn the wheel either to the right or left as far as it will go, cramping the front wheels completely. After loosening the nut on the eccentric bushing clamp stud, turn the eccentric bushing until all motion between the worm and worm wheel is taken up. Then clamp the bushing tight again.

If it is impossible to take all the play out between the worm and wheel by this method, take off the spark and throttle connections, loosen the dash bracket and also the frame bracket of the steering gear. Remove the steering arm from the squared shaft and after rotating the worm wheel through a quarter turn, replace the arm in the new position. This will present a new surface of the worm and wheel for wear.

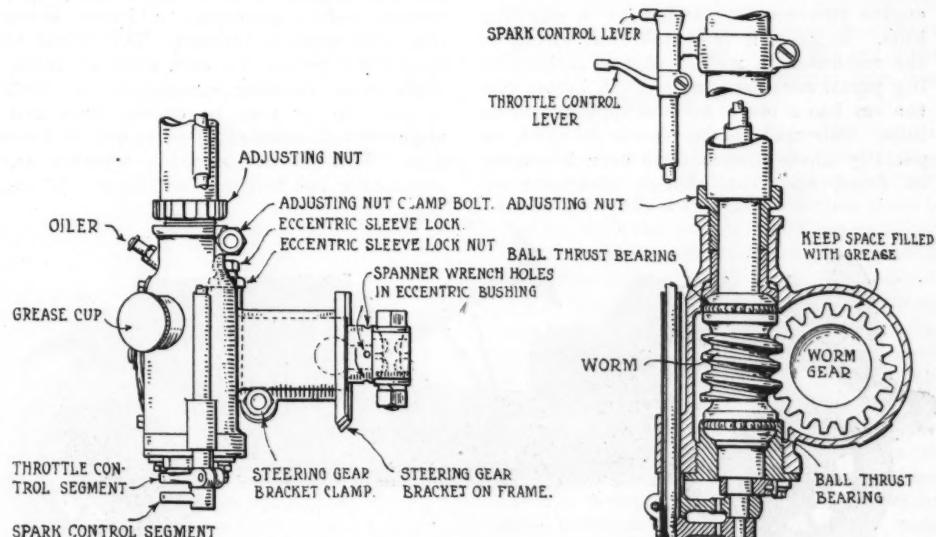


Fig. 9—Exterior and interior views of steering gear, showing how play can be taken up. Adjust with wheels locked to one side as far as possible

Then make the adjustments as instructed before and carefully tighten the eccentric bushing clamp stud nut.

Engines

Timing of Midland

Q.—What is the timing of a four-cylinder Midland 40?—R. N. Ford, Williamstown, Mo.

In terms of piston travel the valve timing of the 1912 Midland is as follows: The inlet valve opens when the piston is $\frac{1}{4}$ in. past top dead-center and closes when the piston is $\frac{1}{2}$ in. past lower dead-center. The exhaust valve opens when the piston is $\frac{1}{2}$ in. before lower dead-center and closes when the piston is $\frac{1}{2}$ in. past top dead-center.

Radial Multiple-Cylinder Engine

Q.—Do you know of any radial engine that has four, six or more connecting rods on each throw of the crankshaft? Publish illustration of same.—A. G. Larson, Grinnell, Iowa.

Fig. 8 shows a diagrammatic view of the seven-cylinder Gnome revolving engine, which has a stationary crankshaft with the seven connecting rods coupled to a single throw of the crankshaft.

Radial engines of four or more cylinders have been in use for many years, as far back as 1901. The five-cylinder Manly radial engine was a prominent design. Then there was the 300-hp. Salmon radial engine, of comparative recent date, which had horizontal cylinders and drove the propeller by bevel gears. This engine also was made with nine cylinders, conventionally placed like the spokes of a wheel. In addition to these foreign engines there is the American engine called the Gyro-Duplex, which has nine cylinders. There are other radial engines, both foreign and American, using as many as fourteen or even twenty cylinders. Of the latter the Gnome is an example of a fourteen-cylinder and the 200-hp. Anzani of the twenty-cylinder. In Fig. 7 is shown an exterior view of a radial engine, the seven-cylinder Clerget.

Aluminum Pistons on Jeffrey

Q.—Will aluminum pistons increase the speed of my Jeffrey touring car, model 671, and decrease the pulling power at low speed on hills and through mud?—E. Hamilton, San Jose, Calif.

Aluminum pistons will not decrease the engine power at low speed, as in climbing hills. In fact, it is stated that owing to the reduction in weight of the reciprocating parts, acceleration is much better and the car has a much more snappy action on hills. This may not be true in all cases, especially where pistons have been improperly fitted and not enough clearance al-

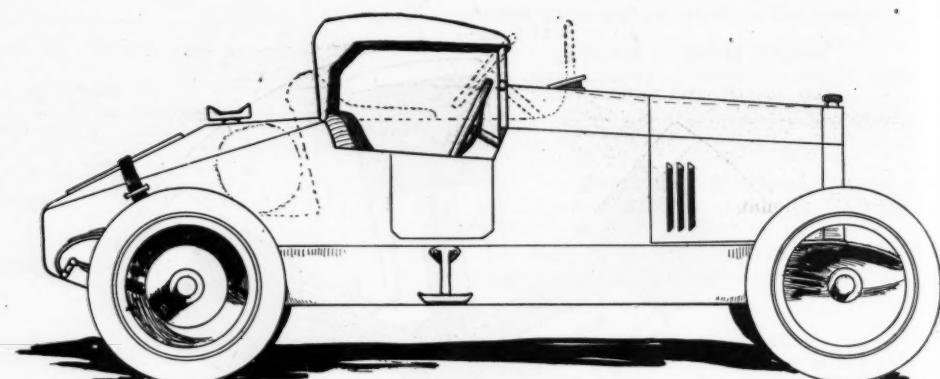


Fig. 10—Suggestion for converting 1914 Marion into speedster, showing gasoline tank under rear deck

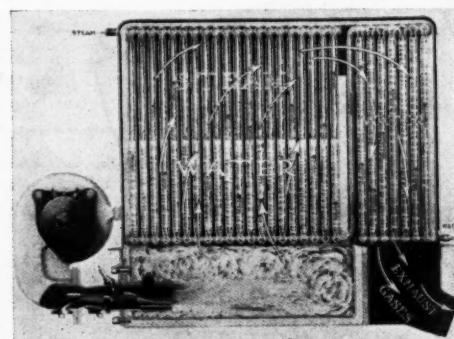


Fig. 11—Cross-sectional view of Doble generator, showing economizer and vaporating sections

lowed. The best way to get aluminum pistons is to send the makers one of the old cast-iron pistons and state that you wish to substitute for it a suitable size in the light weight type.

Knock in Ford Engine

Q.—What is there about a Ford to knock when the main bearings and cam bearings have been tightened up and new oversize pistons put in?—W. L. Skinner, Miller, Ala.

Knocking might be caused by the cylinders having been bored out too much for the pistons, producing a piston slap. Or, the rings may fit improperly. There is also the possibility of worn pushrods or guides, or the clearance between one or more valves and tappets may be too great. Also the timing gears may be out of mesh at a certain point, producing a knock every time that point is reached. This would be caused by either the cam gear or crankshaft gear running eccentrically on their shafts. Or, it may be caused from misalignment of crankshaft or camshaft bearings. You do not mention whether the connecting rod bearings are tight. If one

or more of these are loose, a knock will result.

If your engine is fitted with one of the special distributor systems of ignition you may have this timed wrong, so the spark is advanced too far. Inasmuch as your engine has been overhauled it is likely also that the knock may simply be due to the parts not having become worn in. The best way to do this is to jack up the rear wheels and let the engine run slowly. Open the drain cock of the radiator and let a small stream of water run into the top. This provides ample cooling, and in addition plenty of good oil should be fed. After several hours of such treatment, you will find the engine in very good shape and many of the former knocks may have disappeared.

Probably Noisy Pushrod

Q.—I have a new Studebaker, 4-18 series, and it has a very annoying tap or click, much like a valve tap, but much louder. I am almost positive I have traced and located it in the oil pump. Can such be the case? Advise a remedy.

2—At times the engine in my Studebaker runs fine but on grades seems sluggish and does not pick up as it should and lacks power. What causes this?—R. M. Marlow, St. Louis, Mo.

1—It is not likely that this is in the oil pump, as the latter is gear driven and the only noise issuing from it would be a gear noise. The chances are you have a pushrod that needs adjustment. Metal possesses peculiar properties for conducting sounds and very often a knock is traced to some part, when the noise seems clearly to come from another part.

2—There may be any number of things the matter with your engine. Improper adjustment of the valves, too rich or too lean a mixture, improper spark, etc., all tend to make an engine run sluggishly. The knock you speak of leads us to believe that your valves need attention. Too much clearance between the valve and pushrod causes noise and also allows the valves to open too late. This means that the cylinders will not take in a full charge and the exhaust gases are not given ample time to get out. This retards the whole process of power producing and consequently the car does not perform up to its full efficiency.

Engine Uses Too Much Oil

Q.—I have a 1912 model R Reo touring car which has run about 20,000 miles. It requires three times as much oil as it did when new and seems to be losing its compression. Would new piston rings be of benefit?

2—How much oversize would be necessary? 3—Where could I purchase piston rings and what would be the cost?—R. H. Bunker, Upland, Neb.

1—New rings would be advisable and if

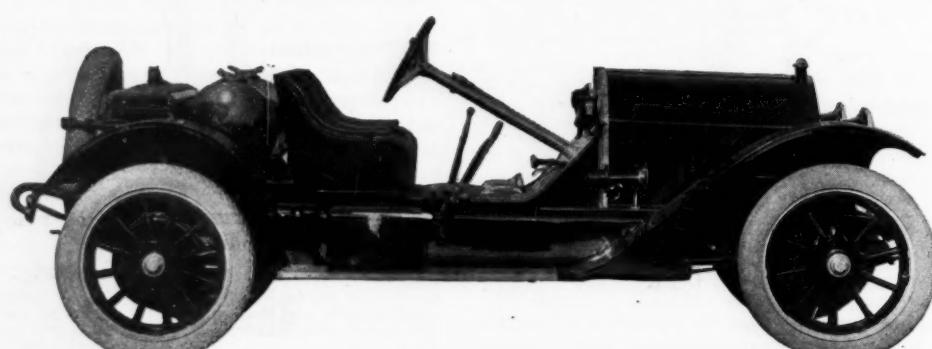


Fig. 12—Stutz Bearcat, asked for by reader who wishes to rebuild Chalmers like it

necessary, new pistons as well. If there is considerable wear in the cylinders the latter should be re bored and oversized rings and pistons fitted. Sometimes temporary relief can be had from excessive oil consumption by using a heavier oil. Installing a set of some of the patented rings on the market might be of benefit also.

2—The amount of oversize should be determined from the amount of wear in the present cylinders. Should you get the rings a little too tight, they can be lapped in with very fine powdered emery and oil.

3—The patented forms of rings you will find advertised in MOTOR AGE. Plain piston rings can be had from the following concerns: Inland Machine Works, St. Louis, Mo.; Spacke Machine & Tool Co., Indianapolis, Ind.; Ferro Machine & Foundry Co., Cleveland, Ohio.

Bore and Stroke of Chalmers

Q.—Give stroke and bore of Chalmers 1913, model 18, six-cylinder engine. What is its rated horsepower?—C. S. Sorensen, Chicago.

The engine is this model is $4\frac{1}{4}$ by $5\frac{1}{4}$. The N. A. C. C. rating is 43.8 hp.

Rebuilding

Rebuilding 1912 Chalmers

Q.—I have a 1912 Chalmers 36 four-passenger torpedo, which I am thinking of cutting down into a speedster, something on the order of the Stutz bearcat. Could you publish a picture of the Stutz bearcat? Where could I get the seats and tank like this car? About what would they cost?—Carson Brown, New Canton, Ill.

The Stutz Bearcat model is shown in Fig. 12. Turn to the advertising pages of MOTOR AGE, where you will find listed concerns making a specialty of furnishing seats and tanks similar to these. Seats average \$25 per pair, while the tank would cost in the neighborhood of \$18.

Hupmobile Speedster

Q.—Give description and specification for racing body for Hupp 1916 five-passenger.—Harry A. Vollmer, Bokoshe, Okla.

A suggestion for this car converted into a trim-looking speedster is shown in Fig. 13. The dotted lines show the original body and from this you will see that the new body has been lowered quite a bit. There is also a continuous line from radiator to rear along the hood hinge, while the top center line of hood and cowl is continued on the after deck in a graceful slope to the spare wheel carrier.

The front fenders are just large enough to prevent mud and water from being splashed on the occupants. The rear fenders are built with a step incorporated in them, eliminating running boards.

Wants to Build Speed Body

Q.—Show sketch of a speedster body for a 1914 Marion car, model A-38, with a door on each side, as the car has center control and it will be necessary to have two doors. I want to put a neat little windshield and top on it, but do not want any fenders. I want to place the seats on the frame. I have a 30-gal. oval gasoline and oil tank, with two large caps and handles, which I wish to put back of the seats, so the caps will just project up through the body. The rear deck is to have a door or lid in it and a compartment inside for storage battery, tools, etc. What gage material should I use?—Reader, Bloomington, Ill.

In Fig. 10 is shown a suggestion for a speedster following the lines you wish. The tank under the rear deck is shown by the dotted lines with large filler caps extending through top.

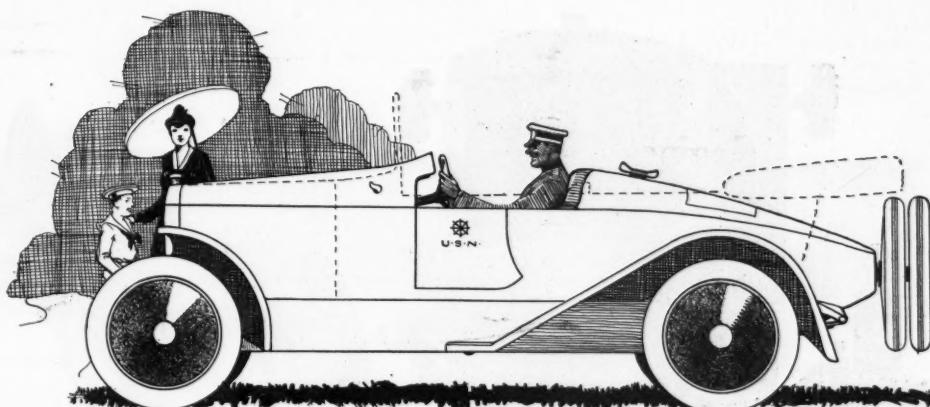


Fig. 13—Suggestion for converting 1916 Hupmobile into speedster. The tank is in the long tail

Use 22-gage metal for making the body, or if you have a substantial under structure you can use 24-gage. The best metal for this is what commonly is called leaded steel. This metal works well and the lead coating prevents rusting. It comes in sheets 36 by 120 in.

cylinder displacement. It is impossible for a carburetor to deliver to the cylinder more gas than the valve opening allows. The proper size carburetor for a single cylinder engine would have its passageway equal in area to the valve opening of the engine. Where there is more than one cylinder this area is multiplied by the number of suction strokes taking place at the same time. The latter can be determined by the sequence of the cranks.

The engine will not develop its rated horsepower if too small a carburetor is used, as at high speeds a full charge is not delivered. Too large a carburetor is not only wasteful of fuel but reduces the power of the engine by furnishing too weak a mixture.

Adjusting Stromberg Carburetor

Q.—I have a 1913 Buick with Stromberg carburetor which is giving me considerable trouble. Instruct me on correct adjustments.—Subscriber, Rock Island, Ill.

This carburetor has a spray nozzle, PN, Fig. 14, mounted in the center of the float chamber with its point $\frac{1}{8}$ in. above the normal gasoline level and surrounded by a modified venturi tube. The nozzle is proportionate to the size of the carburetor and is not intended for adjustment.

The level of the gasoline in the float chamber is adjusted at the factory and should be about $\frac{1}{8}$ in. from the lower edge of the glass marked X. If the level is wrong, remove the dust cap D and turn the adjusting screw S until the level is correct. If the level is too high, screw the nut down and vice-versa. The carburetor has low- and high-speed adjustments.

For low speed turn up the adjusting nut A until the spring S1, the low-speed spring, seats the valve lightly. See that the high-speed spring B is free and does not come in contact with the nut on top of the auxiliary air-valve spring. Start the engine and turn nut A up or down until it idles properly.

For high-speed adjustment advance the spark and open the throttle. If the engine backfires turn the high-speed adjusting nut B up until backfiring ceases. Then, if the engine gallops at low speeds or the carburetor loads up the mixture is too rich. The nut B then should be turned down until the trouble ceases. The spring above the nut B should have at least $\frac{1}{2}$ in. clearance between it and the nut on top when the engine is at rest. Always make carburetor adjustments with the engine hot.

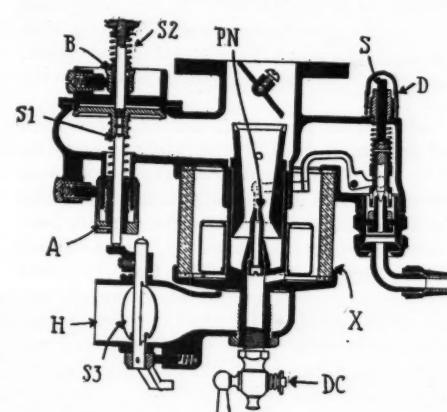


Fig. 14—Sectional view of Stromberg carburetor, with adjustments indicated

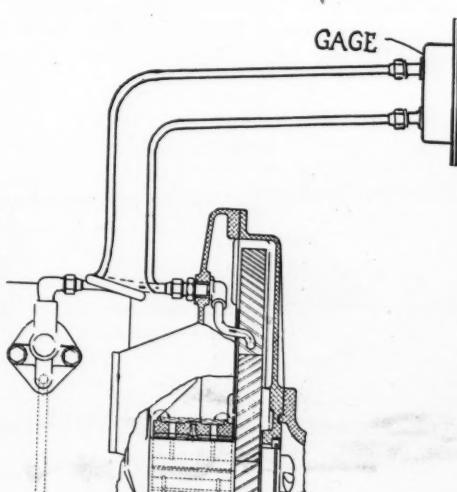
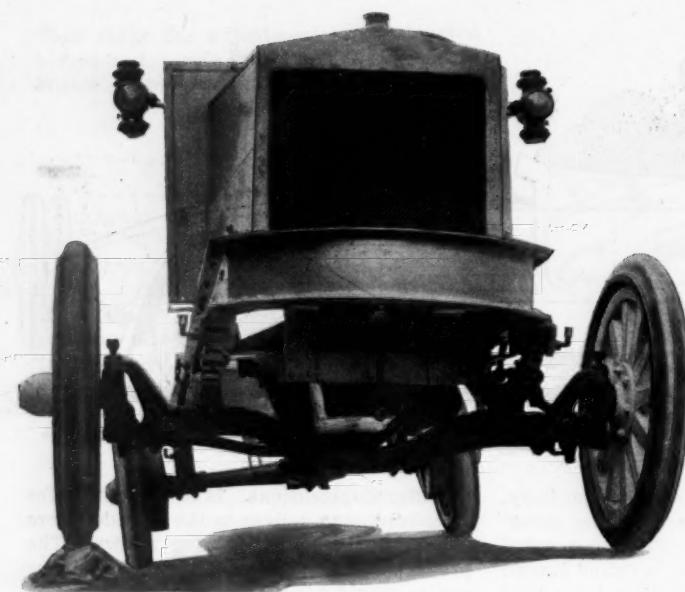
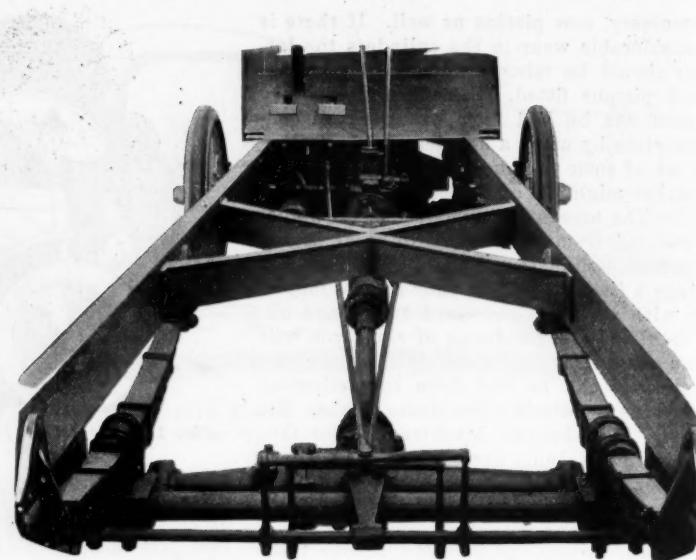


Fig. 15—Installation of sight-feed gage on dash



Front of Traffic 2-ton truck, showing flexibility



Rear end of Traffic truck, showing cross-bracing frame

Traffic Two-Tonner at \$1,095

New Company to Concentrate on One Model

A TWO-TON truck designed to sell at \$1,095 is the production of the Traffic Motor Truck Corp., St. Louis, Mo., a concern organized and financed recently with this particular field in view. Plans have gone forward so well that the company now is in production. To turn out a vehicle capable of carrying 4000 lb., at a price to sell in the \$1,000 class is something of an achievement in this day of high cost of materials and production. It has been made possible, according to those who stand sponsor for it, by standardization of production. The one model is the only one the Traffic Motor Truck Corp. intends to build and this on a quantity production basis, the output for the first year being based on 3000.

In general, the chassis is conventional, the only innovation being a distinctive type of cross-bracing of the frame by an X-shaped member and rounded instead of square ended frame. The front of the frame acts as a bumper and protection to the radiator. The engine is a valve-in-head

four-cylinder of 3½ by 5-in. bore and stroke. It is the product of the Gray Motor Co. Cooling is thermosyphon, ignition is a Kingston magneto with impulse starter, and the carburetor is a Carter with gravity feed.

Lubrication is a combination force feed and splash, a gear-driven pump supplying oil to the timing gears and main bearings. The clutch is a Borg & Beck and the gear-set, which is a unit with the engine, provides three speeds forward. It is manufactured by the Covert Gear Co. The unit powerplant is suspended at three points. The drive is taken through a tubular propeller shaft with three universals, and the alignment of the front shaft is maintained by self-aligning ball bearings. This construction is designed to eliminate vibration, whipping and other distortions.

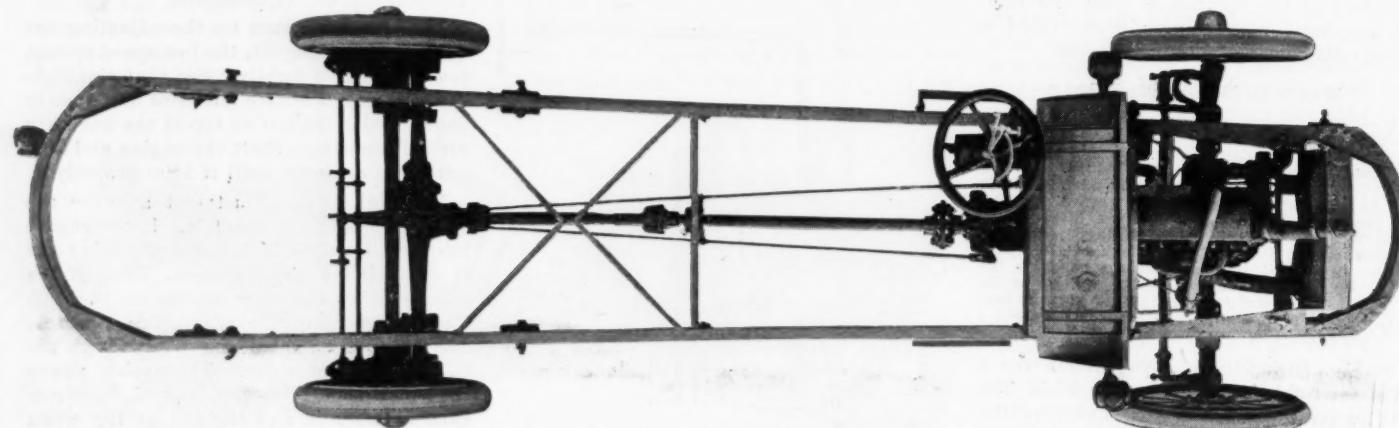
Final drive is through internal gears, the rear axle being manufactured by the Russell Motor Axle Co., and the wheels being mounted on roller bearings. The front wheels likewise are on Timken rollers. The

springs are semi-elliptic all around. Tires are the pressed-on type of solids, 34 by 3 in front and 33 by 4 in the rear. The wheelbase is 133 in. The length of the frame back of the seat—that is, the loading length—is 122 in. The turning radius is 26 ft., and the road clearance is 12 in.

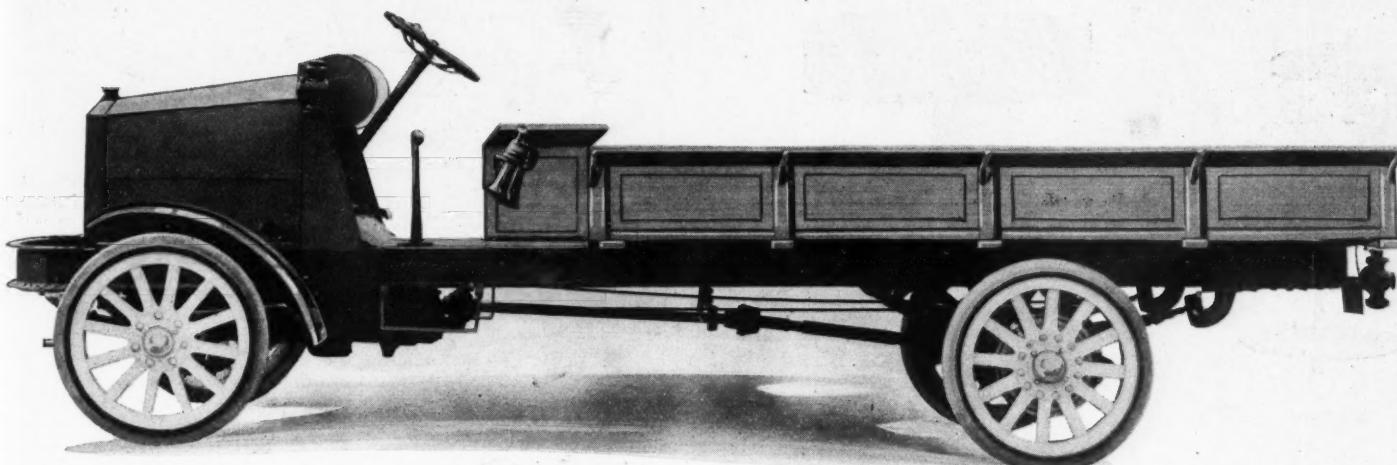
The Traffic Motor Truck Corp. was organized in St. Louis during the past year and has a capital of \$500,000. The officers of the concern are M. P. Mammen, formerly sales manager of the Westcott Motor Co. as president, T. C. Brandle, St. Louis, Westcott and Chevrolet distributor as vice-president and sales manager, and Guy Wilson as secretary-treasurer.

COMET APPEARS IN VAUDEVILLE

Motor cars have appeared on the stage before this but when the Comet Automobile Co., of Decatur, Ill., introduced its new centennial model of the Comet Six as one act in the vaudeville performance at a local theater, a new method of advertising was hit upon. The illustration shows how well



Airplane view of chassis of Traffic truck. Note the rounded corners of the frame instead of squared



The Traffic 2-ton truck complete. The length of the loading space is 122 in.

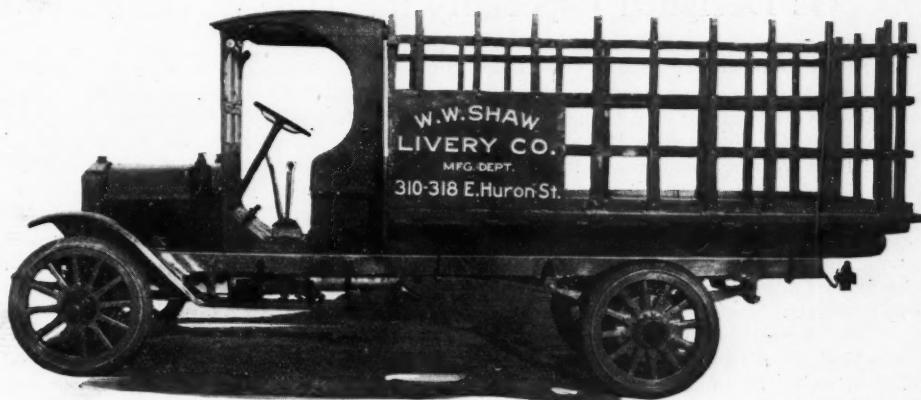
the setting was arranged and the woodland effect in which the car was exhibited made a distinct hit. This was the first appearance of the new centennial model, which is built on the same chassis as used on the 1917 car with a $3\frac{1}{2}$ by 5 six-cylinder engine and a 125-in. wheelbase. While the rakish yacht lines have been preserved in the new design a beveled edge has been incorporated, the bevel being carried forward into the hood.

The concern has a new factory over 600 ft. long which is built of concrete throughout including the roof.

A new truck of one-ton capacity has been developed. It has a four-cylinder Lycoming engine and has electric starting and lighting.

SHAW TAXICAB TRUCK

On this page is reproduced a photograph of the new Shaw 2½-3-ton truck which is a product of the Walden W. Shaw Livery Co., Chicago, builders of Yellow, Black and

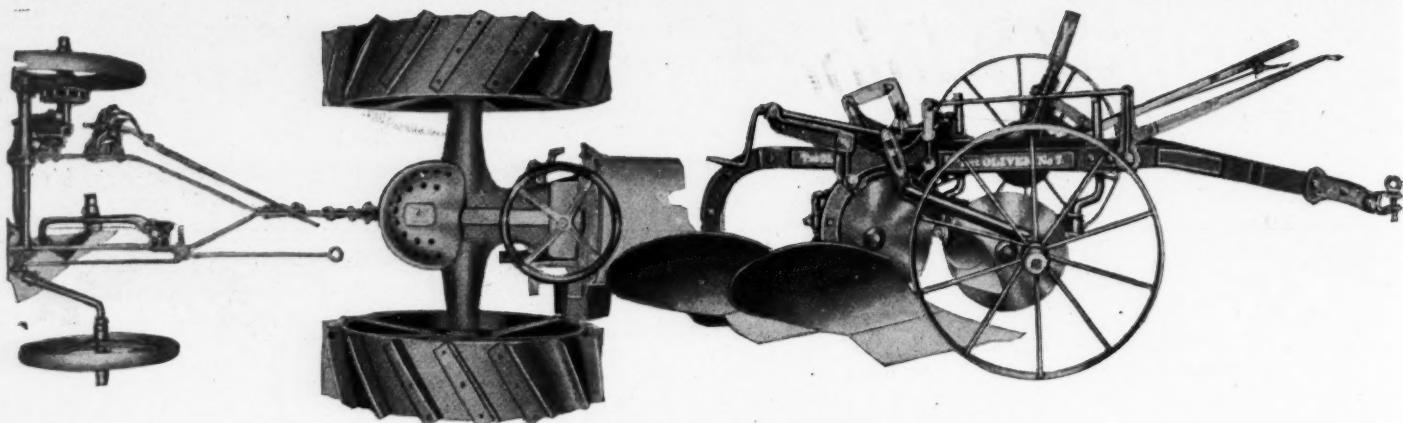


The truck brought out by one of Chicago's largest taxicab concerns

White and Shaw taxicabs. The truck has a wheelbase of 144 in. and is fitted with a Continental engine of $4\frac{1}{8}$ by $5\frac{1}{4}$ bore and stroke. The engine is in unit with a Brown-Lipe gearset, and Timken axles are used.



How the new Comet centennial model appeared as one act of a vaudeville show



Oliver No. 7 plow, showing it in alignment with tractor

Oliver for Fordson Tractor Is Designed Especially for This Work

OF parallel importance with the development of the Fordson tractor is the coincident development of the Oliver No. 7 two-bottom tractor gang plow by the Oliver Chilled Plow Works, South Bend, Ind. The No. 7 plow is designed to work especially with the Fordson tractor, and the combination makes an economical and practical plowing unit. As plowing is by far the most important work a tractor is called upon to do, its highest efficiency and economy to the farmer depend largely upon the plow which is pulled behind it. The Oliver No. 7 is designed to deliver this highest efficiency with the Fordson. It levels automatically; pulls straight ahead under all circumstances and has no side draft.

Weight Reduced

By employing a heat-treated alloy steel the Oliver makers have reduced its weight 25 per cent below that of ordinary two-bottom engine gangs of similar capacity and still have retained strength and rigidity. In competitive test with the standard two-bottom engine gang made by the same company, in stony and stumpy ground, along old hedge rows and fence lines, the No. 7 came through the tests, despite its lightness, with less damage and breakage than was experienced with the standard type.

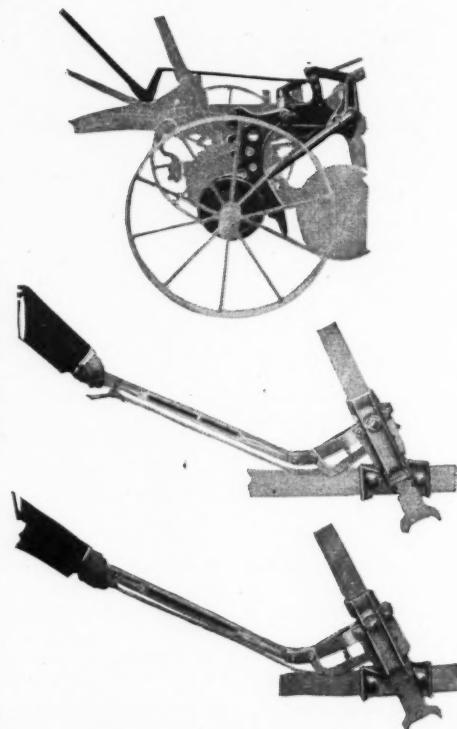
The new plow regularly is equipped with the NC23 14-in. general-purpose bottom, shown in the illustration. This bottom has the Oliver quick-detachable share, which makes possible a change of shares in a few seconds' time and without the use of a wrench. Standard equipment also includes the Oliver rolling coulter and jointer, which, together with the wide rake of the plow and the height of the beam, insures a clean field surface with all trash and weeds at the bottom of the furrow.

The illustration shows that the No. 7 plow operates in perfect line with the draft of the tractor, thus eliminating all side draft and insuring economy of operation of the tractor through the saving of fuel and the utilization of every ounce of tractive power for plow operation. A lever projects forward from the frame of the plow to within easy reach of the operator. This is connected with a powerful jack by which the depth of plowing is regulated. The illustration shows how the two opera-

tions of increasing and reducing the depth of plowing are controlled by the one lever.

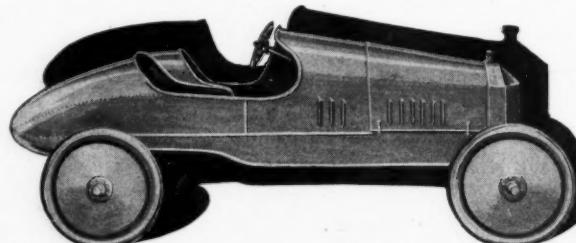
The lifting device, also shown in the illustration, is simple and operates only when the bottoms are being raised. There is no idle running of any of the parts, insuring durability, because the lifting apparatus of an engine gang usually wears out first. The locking device consists of a double link which drops over the center when locked in place. The action of the lift is positive. Raising the lever moves the teeth of the lifting cam into mesh with the gear on the land wheel. The power for lifting comes from near the center of the axle and gives the greatest possible leverage to do the work. When lifted the point of the front bottom is 8 in. above the level of the ground, and the point of the rear bottom is even higher. This is exceptionally high and gives ample clearance for turning corners, etc.

Through proper adjustment of the leveling device the bottoms automatically are kept level regardless of the depth of the furrow, and all tendency to wing is eliminated. This feature enables the operator to plow at any depth he desires without



How the bottoms are raised, center, and lowered, below, for plowing

being compelled to manipulate a leveling lever every time he changes plowing depth.



Paco Racing Bodies

The Paco Mfg. Co., Galesburg, Ill., is manufacturing a line of trim-looking speedster bodies for the Ford chassis. The bodies are made of heavy gage sheet steel, with oak sills and oak frame for the dash. The construction is such that the lowest point of the body is 8 in. below the car frame, hiding the cranekase and giving the car a long, low appearance. Considerable study and experiments were made to evolve a design offering the least wind resistance. There is a long hood over the engine, sloping upward slightly and blend-

ing into the cowl. The seats are low and comfortable. The rear end recedes gracefully and is patterned after the famous French racing cars.

The bodies are shipped ready to mount on the chassis. The same steering post and foot pedals are used, complete fittings being furnished to lower the steering column and fit the foot pedals. Shafting and attachments for the hand brake lever also are furnished. The illustration shows the Paco model 21, which is fitted with disk wheels and V-type radiator.

The Motor Car Repair Shop

Grinding in Lathe

A GROUND surface does not necessarily mean that it is true. Failure to make a success of small grinding with one of lathe grinding attachment often has occurred owing to the fact that the lathe was not true. No repairmen can expect a good job of grinding with a lathe the headstock of which is out of line. Also, the spindle may be a little off, or the tailstock out of line. The result is that a job, instead of coming out parallel will have more or less taper to it, depending on the amount of inaccuracy. See that the slide rest is in perfect shape. If it is poor and unsteady the irregularities in the work may be almost anything. If, in addition the work is loose between the centers, obviously no good work may be expected.

Welding Torch Lighter

Richey, Mont., Editor MOTOR AGE—The accompanying illustration shows a handy device I have made for lighting a welding torch. The apparatus consists of an old Ford timer, four dry cells, coil and spark plug. The timer is screwed to the edge of the bench as shown, drilled and tapped for a plug. Two brass strips are fastened to the timer case, so they rest in the position shown. The different members are then connected up as in the diagram. If the brass torch tip is slipped between the brass contact pieces, a spark will be produced at the plug points, which lights the torch. The hardiness of this device is apparent to those who have frequent use for a welding torch.—Joseph H. Jacobs.

Post Drill Attachment

Many of the smaller repair shops have only the post hand drill with which to do all the boring of holes. These drills are capable of taking drills usually from $\frac{1}{4}$ to 1 in. The chucks on most of the post drills are bored out for holding drills with a $\frac{1}{2}$ -in. straight shank.

When it comes to drilling holes smaller than $\frac{1}{4}$ in. the repairman must rely on a breast drill or small hand drill. Most of the breast drills come with a chuck attached to a threaded shank about $\frac{1}{2}$ in. in diameter. When it is, therefore, desired to drill small holes they can be handled in the post drill by removing the shank and chuck from the breast drill and clamping it in the chuck of the post drill, with the small drill point located in the breast drill chuck the same as in regular use. If the shank is a little too small to fit snugly in the large chuck, which would make the drill run out of true, make a metal bushing out of thin stock and fit it around the shank. This comes in handy in cases where it is desired to drill small holes in nuts or bolts for cotter pins.

In connection with drilling mention might be made of applying pressure on a breast drill when holes have to be bored in the car frame or such parts from under-

neath. Some owners and repairmen make the mistake of trying to apply pressure on the drill by pulling upward on the end plate fastened to the drill frame. This is a very tiresome procedure.

The way to handle this is to get a short piece of hardwood about 2 ft. long and a block of wood or a common brick. Place the block or brick on the floor about 6 in. from the drill and put the stick on the block so that one end of it rests against the plate on the drill. The operator now sits on the floor and holds the drill steady with the left hand while he swings his leg over the stick; the resultant lever action forcing the drill point on the work, and he has nothing to do but to turn the handle with the right hand.

Cutting Slot with Hacksaw

Sometimes the owner has occasion to cut a small slot in a piece of metal and while there are several ways of doing this there is one that recommends itself on account of its simplicity. Supposing it is desired to cut a slot, say $\frac{1}{8}$ in. wide. Instead of cutting down one side of the slot with the saw and then the other, breaking out the piece and finishing up with a file, put two or three blades in the saw frame and make only the one cut. The resulting slot will have its sides parallel and there will be no piece left to be broken or cut out. The

extra blades also stiffen the saw and a better job can be done.

Squeaking Brakes

Editor MOTOR AGE—In a recent issue of MOTOR AGE I noticed two suggestions for preventing the brakes from squeaking, which are all right, except that they are bound to lower the brakes' efficiency. In my experience, covering several years, I have discovered a kink which, I am sure, is far more effective and lasting for stopping this most annoying trouble than the suggestions referred to.

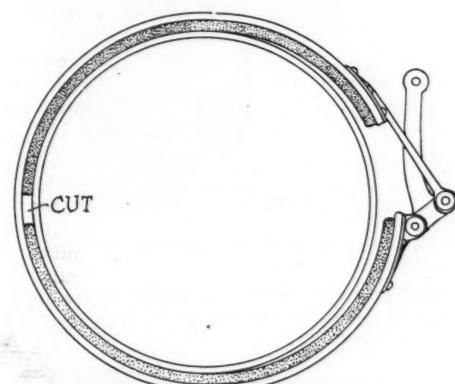
Pick out the car with the squeakiest brakes you know of and proceed as follows: Drive a screwdriver between the brake band and the drum on the side opposite the pull levers, thus raising the band slightly at this point. Then take a coarse hacksaw blade and saw a section of the lining about $1\frac{1}{2}$ in. long right out, away from the band, thus leaving a little gap in the circumference of the lining. After this is done to both wheels, take the car out, get a good start and then put on the brakes good and hard. Notice how much better they take hold and also the complete absence of squeak. I do not know any scientific reason for this, but it is a practical fact, which can be proved easily in a half-hour's time, on any car with contracting band brakes.—Wayne Nutting.

Heavy Duty Screwdriver

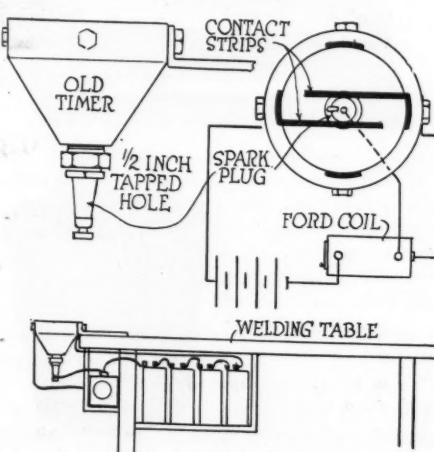
An old flat mill file is just the thing for making a heavy-duty screwdriver out of. The first thing to do is to heat the file in a fire to a red and let it slowly cool. Now heat it in the center and place it in a vise, giving it a bend of 90 deg. When cool the file should be ground on an emery wheel so the point of it has the form of a conventional screwdriver, but of course, larger than ordinary screwdriver. Such a tool is very handy for getting into out-of-the-way places and tremendous leverage can be obtained by slipping a length of pipe over the bent portion while someone holds the other part firmly against the screw to be removed.

Replacing Wheel Bearing

In replacing a bearing upon a front wheel spindle to which it is a tight fit, mistake is sometimes made of slipping the bearing on the taper part of the spindle and then forcing it home against the inner shoulder by putting on the wheel behind it and then using the wheel as a hammer so that the wheel and bearing are forced on the spindle the same time. This is bad practice as the strain imposed on the bearing in this way may result in the breaking of the hardened shoulder of the inner race, which is designed for wear and not to meet sudden shocks. The best way is to slip a piece of pipe over the spindle so that its inner end rests against the bearing. The outer end is then hammered gently and the bearing in most cases will drive into place properly.



How reader would eliminate squeaking brakes on car



Reader's device for lighting welding torch

The Accessory Corner

U-See Filling Station

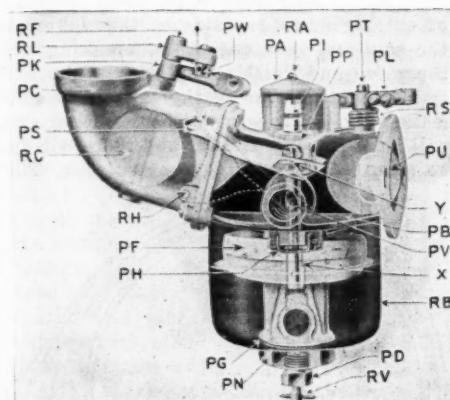
THE U-See station operates by drawing gasoline from twin 5-gal. water bottles. If the customer asks for 5 gal., one cock is turned and the contents of one bottle is emptied into the customer's gasoline tank. If he asks for 10 gal., both cocks are turned and both bottles empty. A scale on the bottles makes it clear when the 3-gal., for instance, mark is reached if smaller quantities are wanted. At night the twin 5-gal. water bottles from which the gasoline is drawn are illuminated by an electric lamp, so the customer can see at night as well as in daytime that he is getting full measure. The machine is furnished with vacuum pump. About 5 lbs. vacuum is necessary to operate the machine. A small electric-driven vacuum pump does the work, and a 75-cent electric current bill a month will handle 25,000 gal. of gasoline, it is claimed. The small vacuum tank is part of the machine and no pressure is put on the gasoline storage tank under ground.—U-See Mfg. Co., Springfield, Ill.

Dave Buick Carbureter

The distinguishing feature of the Dave Buick carbureter is that it has a variable gasoline jet controlled mechanically by the flow of air through the throat, which results in maintaining the required ratio between gasoline and air at all speeds, it is claimed. There is no mechanical connection between the throttle and the gas jet or the air shutter. As the throttle is opened more air is pulled through the mixing chamber, raising the air shutter and at the same time increasing the amount of gasoline permitted to pass into the mixing chamber along the ground surface of the piston. The mixing chamber, inlet pipe and shutter are die cast of white metal and the bowl is of drawn steel, treated by Parker rust-proof process. The fuel enters the bowl RB through the valve PV, controlled by a float PF, which maintains a constant level in the bowl. The fuel passes



U-See gasoline filling station



Dave Buick carbureter, showing operation

from the bowl through a screen into a cylinder in the center of the bowl, in which is a

hollow piston, PP, which hangs on the end of the shutter PS. The shutter turns on a shaft, PH. At the slower speed the shutter turns so as to close the passage through the carburetor except for an opening in its end and in the head of the piston. The fuel then is drawn up from the hollow inside of the piston through the jet Y and is mixed with the air rapidly passing this jet, the opening of which is controlled by a screw, PI. As the speed is increased by opening the throttle PU the shutter is raised and this raises the piston. Then a small opening is made between the flattened face X and the cylinder in which the piston travels and additional fuel is drawn out at this opening. Adjustment is made by slipping the cap spring RA to one side and removing the cap PA. The idle screw P1 is turned down to get a leaner mixture and up to get a richer mixture.

Pipe Tools

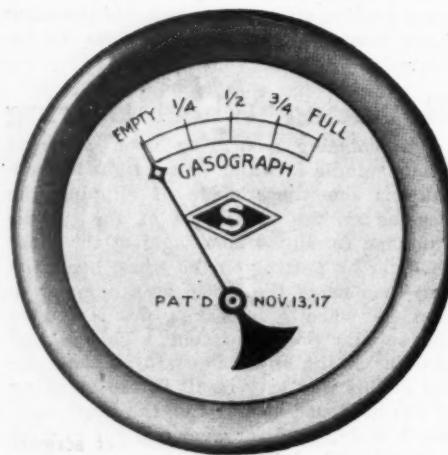
A revised and complete edition of the GTD pipe tool catalog is now ready. It shows the complete line, including the new reeding pipe threader. The catalog also gives standard dimensions for wrought steam, gas and water pipe, drill sizes for pipe taps, pipe thread, wire gage, copper wire, conduit sizes to be used with different sizes of wire and cable and other information in the form of tables convenient for reference.—Greenfield Tap & Die Corp., Greenfield, Mass.

Battleship Radiator Emblem

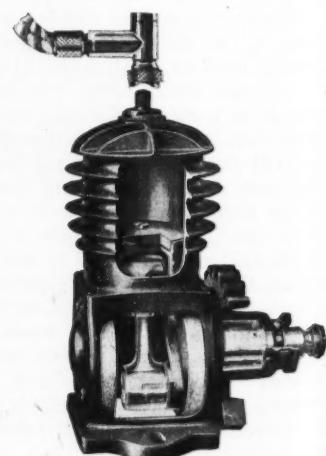
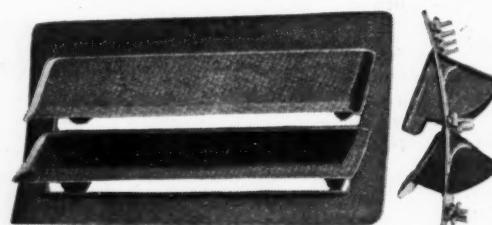
Now there is an 11-in. battleship gun for the motor car. It comes for attachment to the radiator cap and fenders. The device is made of steel finished in baked black japan. It holds three flags and fits any radiator even if another emblem is attached, it is claimed. Price, 50 cents.—Seng Auto Device, 1305 Michigan avenue, Chicago.

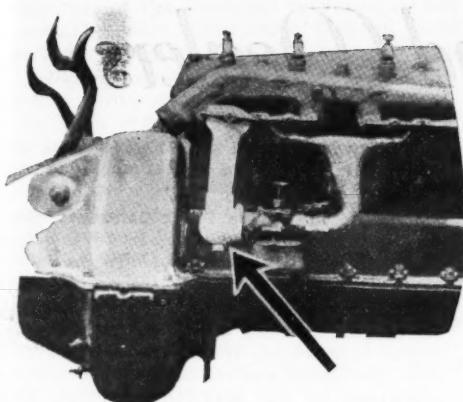
"Keep Your Car Young"

The Johnson products have been crystallized for ready reference in their rela-



Left, Gasograph, a dashboard gasoline indicator; upper center, Petry ventilator; lower center, Boko collapsible bucket; and right, Hilton valveless pump





A-C carbureter attachment installed

tion to the car through the publication of a small booklet called "Keep Your Car Young." Here we find Johnson's cleaner, prepared wax, Stop-Squeak oil, Black-Lak, Auto-Lak, carbon remover and Freeze-Proof described as to their merits, with a short synopsis of their value to the car owner at the end.—S. C. Johnson & Son, Racine, Wis.

Gasograph

The Gasograph is a dashboard gasoline indicator designed to tell at a glance the exact condition of the gasoline supply regardless of the tank's location. It is adaptable to all cars using vacuum or gravity feed. Pressure created by the weight of the gasoline is transmitted through a small copper tube to the instrument on the dashboard and the quantity of gasoline is indicated on the dial by the position of the hand.—New Standard Adding Machine Co., 3701 Forest Park boulevard, St. Louis, Mo.

Boko Bucket

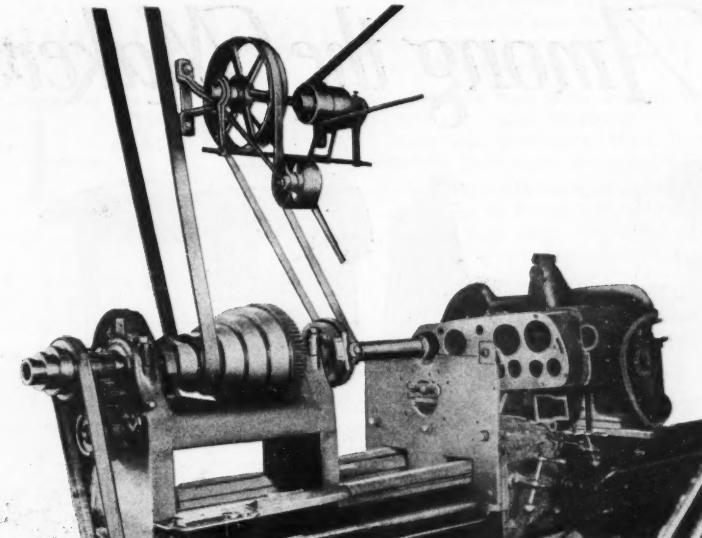
The Boko bucket carries either water or gasoline without leaking and folds when not in use. It is made of high-grade water and gasoline-proof fabric, double sewed and tightly cemented. The capacity is 2 gal., and folded, the bucket measures 10 in. in diameter by $\frac{3}{4}$ in. thick. Open, the bucket is 10 in. deep. A flexible tube at the side fastens over the top when the bucket is full. This tube takes the place of a funnel and eliminates the use of valves. To use, the tube is unhooked, and placed in the opening in the gasoline or water tank. A slight pressure with the finger on the tube controls the flow.—Defiance Welding Co., Defiance, Ohio.

A-C Carbureter Attachment

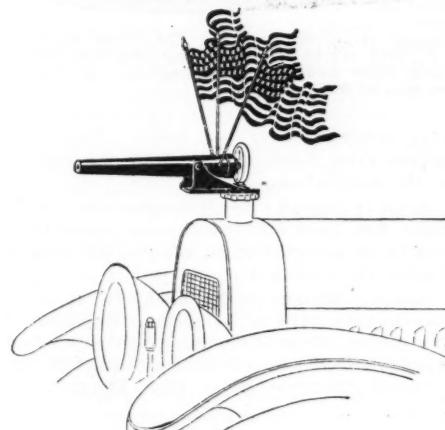
The A-C high and low-speed carbureter attachment is installed by removing the regular hot-air pipe to the carburetor. The attachment is slipped over the choker tube or air intake to carburetor, using the hot-air pipe furnished and clamping it under the exhaust pipe clamp that originally was used. No drilling is necessary for attachment. It can be installed in 10 min., it is said. With it the makers claim 4 or 5 miles more per gallon. Price, \$3.50.—A-C Mfg. Co., Inc., 2047 Chicago avenue, Chicago.

Valveless Pump

The Hilton valveless pump is fitted with a patented check that is attached to the tube and carried in the tool box. Lubrica-



Acme cylinder grinder, which is equipped to grind large and awkward cylinders



Battleship gun radiator emblem

tion is maintained by large oil-soaked felt washers fastened to the side walls of the case. At the bottom of each stroke the piston brushes against these washers and so lubricates the cylinder walls. The crank-shaft is in continual contact with one felt washer, the oil entering the hole in the shaft being thrown to the connecting rod bearing by centrifugal force. The felt washer may be oiled occasionally through the holes in the case. The device comes complete with 15 ft. of hose and pressure gage attached, as well as a bracket to fit the car. Price, \$15.—Hilton Universal Air Pump Co., Keene, N. H.

Petry Ventilator

The Petry ventilator is opened or closed at will from the driver's seat, according to whether little or much ventilation is desired. It is rain and dust-proof, it is claimed, and throws the air to the floor rather than on the passengers. The device is so constructed that special springs prevent rattle. It is attached to the cowl. Price, \$3.—N. A. Petry Co., Inc., 1307 Race street, Philadelphia, Pa.

Acme Cylinder Grinder

The Acme cylinder grinder consists of grinder, adjustable angle plate for holding cylinder, countershaft with idler, diamond dresser, dresser holder, six grinding wheels and wrenches. The standard equipment

will grind any cylinder $2\frac{1}{8}$ in. and more in diameter and up to 12 in. in depth. It grinds cylinders in blocks of twos, fours or sixes as well as singles. Model B is designed specially for motorcycle cylinders and will grind any cylinder $2\frac{1}{2}$ in. and more in diameter and up to 9 in. in depth. The Acme does not require the cylinder to be rotated, it is said. Price \$165.—Continental Grinder Co., 2804-8 South Fremont avenue, Minneapolis, Minn.

Fillometer

The Fillometer slips into the gas tank under the cushion and projects to the edge of the seat. The part in the tank is equipped with a cork float and connects with a gage dial at the seat edge. The dial shows at a glance how much gasoline is in the tank. A hinged cover over the dial keeps out dust and dirt and prevents evaporation. To fill the tank the cover is raised and tilted back. The opening accommodates standard gas tank nozzles. The device is made of strong 20-gage steel finished with black rust-proof process. Price, \$2.25.—Apex Electric Mfg. Co., 1410 West Fifty-ninth street, Chicago.

D. & P. Governor

The D. & P. vacuum governor fits between the carburetor and the intake manifold, regulating the supply of fuel to the engine by a sliding valve which responds to the suction of the engine. The mechanism consists of a cylinder with an inverted cone suspended in the upper half and a hollow piston in the lower end. The fuel supply passes through the piston and around the cone. At normal engine speed the piston is held at the lower half of the cylinder by gravity, but as the suction increases its rises until at maximum governor speed the upper mouth of the piston fits over the cone, checking the flow of the fuel. An air dash-pot prevents the piston from being lifted too rapidly. The governor speed cannot be altered when once set. The cone is suspended from a bracket screwed into the cylinder head and set by the manufacturer at the desired speed. A hole then is drilled through the cylinder wall and the cone bracket, into which is fitted a pin, and the pin head is broken off. Price, \$20.—D. & P. Auto Repair Co., New York.

Among the Makers and Dealers



5500 MILES IN FIVE MONTHS—Fourteen round trips, aggregating 274 miles each, were made this winter between Brooklyn, N. Y., and Hartford, Conn., by this two-ton truck. The truck took 11 hrs. to make the trip from Brooklyn to Hartford. In five months the car has been driven 5500 miles

ADD Patriotism of Chevrolet—Nine hundred and six Chevrolet men are serving in the Army and Navy.

Hoolinshead Directs Saxon Advertising—M. H. Hoolinshead has been appointed to take charge of the advertising for the Saxon Motor Car Co.

Richman Resigns from Cole—J. F. Richman, factory manager of the Cole Motor Car Co., Indianapolis, Ind., has resigned to accept the position of manufacturing manager of the Allen Motor Co. of Fostoria, Ohio. Mr. Richman had been connected with the Cole company for four years.

Hower Now in War Work—Henry H. Hower, sales manager of the Willys-Overland Co., Toledo, Ohio, has relinquished his duties for the duration of the war and has gone into war material production. He has taken the management of a plant in New London, Conn., manufacturing navy supplies.

Hornbostel Heads Rayfield Branch—E. A. Hornbostel has been appointed manager of the Chicago branch of the Findesien & Kropf Mfg. Co., manufacturer of Rayfield carburetors. Mr. Hornbostel has been with the company for some time and succeeds E. A. Rossow, who resigned after seven years with the company to take up other lines in the motor car field.

To Keep Record of Mileage—The Racine Auto Tire Co., Racine, Wis., maker of Horse-shoe tires, is distributing mileage record books among its dealers to the end that car owners may keep a record of the service given by each tire. The book is so arranged that it will slip into a bill case, though almost every accident that can happen to a tire, from punctures and stone bruises to blow-outs, can be noted in it.

Long-Distance Hupp Driveaway—A distributor from Memphis, Tenn., came to the Hupp Motor Car Corp., Detroit, to drive back twenty-seven cars. In one week sixteen cars went to Clinton, S. C., thirty to Omaha, Neb., and thirty to St. Louis, Mo. The dealer from St. Louis came back again for more cars and reported that his last driveaway was very satisfactory. Only where dealers come to the factory with unskilled drivers are any unsatisfactory reports given. The Hupp applies a coating of vaseline to the cars before

they are sent over the roads. This preserves their finish and is easily washed off at the destination.

Price Is Osgood Sales Manager—Charles W. Price has been appointed sales manager in charge of advertising for the Osgood Lens & Supply Co., Chicago.

Goewey Resigns from Saxon—H. W. Goewey has resigned as advertising manager of the Saxon Motor Car Corp., to take effect April 1, and has accepted a position with the Trussed Concrete Steel Co., Youngstown, Ohio.

Shepard Heads Stromberg Branch—E. H. Shepard has been appointed manager of the Detroit branch of the Stromberg Motor Devices Co., succeeding George H. Hunt. Mr. Shepard has been sales engineer for the Stromberg company in Detroit for the last five years.

Oldberg Mfg. Co. Business Good—The Oldberg Mfg. Co. will complete the mufflers for the Class B trucks by the end of March and work on mufflers for the Nash-Quad trucks April 1. It reports that business this year is 20 per cent greater than the same time last year.

New Wheel Concern Buys Plant—The National Auto Wheels Corp., Wausau, Wis., has perfected its organization by the election of these officers: President, E. J. Coerper; vice-president, Henry Sternitzky; secretary, M. Philipp; treasurer, R. R. Sternitzky. The authorized capital stock is \$150,000. The company has purchased a site at Wausau and expects to break ground late in April for the first unit of a plant for manufacture of a resilient wheel using solid or cushion tires, for motor vehicles, trailers, etc.

Changes in Selden Organization—George C. Gordon has been re-elected president of the Selden Truck Sales Co.; William C. Barry was elected first vice-president; Robert H. Salmons, formerly secretary, second vice-president; Hal T. Boulden, formerly sales director, vice-president in charge of sales and advertising; Wilbur F. Reynolds, formerly export manager, third vice-president in charge of foreign sales. Edwin B. Osborn, formerly assistant treasurer, was elected secretary and treasurer, and Charles E. Williams was appointed assistant sales manager.

C. Henry Mason will handle advertising under Mr. Boulden. The capital stock has been increased to \$750,000.

Ford Lets Airplane Plant Contracts—Several new contracts have been let by the Ford Motor Co. for the erection of airplane factories. These will be used as testing sheds.

Smith Is Assistant Sales Director—Langdon A. Smith has been appointed assistant director of sales for the Maxwell Motor Co., Inc. Mr. Smith was recently general eastern supervisor of the Maxwell company, with headquarters at New York.

Cell-Beam Corp. Is Organized—The Cell-Beam Corp., New York, has been formed to take over the merchandising of the Cell-Beam concealed spotlight, previously manufactured and sold by the Cell-Beam Mfg. Co., Brooklyn, N. Y. The officers are: President, Rex. W. Wadman; vice-president, Nicholas G. Rost; and secretary, J. J. Record.

D'Orlow Now with Republic—Stephen D'Orlow has been appointed research engineer of the Republic Motor Truck Co. of Alma, Mich. Mr. D'Orlow was formerly chief engineer of the Oak Mfg. Co. of the same city.

Myers Back at Boston Branch—Henry T. Myers, for three years sales manager of the truck division of the Studebaker Corp. at Detroit, has returned to Boston as branch manager of the Boston territory to succeed George N. Gordon. Mr. Myers occupied this position before he went to Detroit. He will continue as manager of commercial car sales.

Comer Is Promoted by Case—O. S. Comer has been appointed assistant to the foreign sales manager of the J. I. Case T. M. Co., Racine, Wis. Mr. Comer has been with the company seven years.

Prescott to Manage Disco Sales—Harry F. Prescott has been appointed sales manager of the Disco Electric Mfg. Co., Detroit. He was formerly connected with the Saxon Motor Car Co. sales department.

Theisen-Braithwaite Adds to Plant—The Theisen-Braithwaite Co., Inc., Port Huron, Mich., is erecting an addition 70 by 150 ft. to its present foundry and will install the latest equipment for increasing the production of motor car castings.

Hansen to Represent Grossman—L. V. Hansen has been appointed manufacturers' representative of the Emil Grossman Mfg. Corp., Brooklyn, N. Y. Charles Weinberg has been made detail representative in Texas, Oklahoma and Arkansas, and Sidney S. Frank will represent the company among the export trade in New York and other Atlantic ports.

Stutz Makes Wage Increase—The Stutz Motor Car Co., Indianapolis, Ind., has made a 10 per cent increase in wages for all employees of the factory. In addition the company will operate on the basis of a 9-hr. day with no work Saturday afternoons, making 50 hr. constitute a week's work. Approximately 500 men shared in the 10 per cent increase in wages.

Cadillac Dealer Records Red Stars—The Cadillac Automobile Co., St. Louis, Mo., has in its salesrooms a large tablet which bears the names of 700 Cadillac owners in the community. This record is kept up to date regarding deaths, marriages, etc. For those in war service a red star has been added. Twenty stars are on the tablet. They include several dollar-a-year men in Washington, D. R. Francis, the ambassador to Russia; Fred W. and Russell E. Gardner, Jr., both

members of the Chevrolet body factory and assembly plant there and both in navy service.

Williams Joins Selden Truck—C. E. Williams, formerly assistant sales manager of the Velie Motors Corp., Moline, Ill., is now with the Selden Truck Sales Co., Rochester, N. Y.

Wood Now with Mitchell—L. E. Wood, who was a designer for the Cadillac Motor Car Co., Detroit, has been appointed assistant chief engineer of the Mitchell Motors Co., Racine, Wis.

Williams Now with Selden—C. E. Williams, formerly assistant sales manager of the Velie Motors Corp., has become associated with the Selden Truck Sales Co., Rochester, N. Y., in the same capacity.

Kellar Heads Studebaker Branch—L. A. Kellar has been appointed manager of the Studebaker branch in Chicago. Mr. Kellar has seen service at the Omaha, Neb., Portland, Ore., and Los Angeles, Cal., branches.

Youngsville Radiator Is Reorganized—The Youngsville Radiator Co. has been reorganized and is now styled The Standard Radiator Co., Inc. New capital has been added. C. A. Erickson, formerly sales engineer, has been appointed general manager.

It's Now Commerce Body Co.—The Commerce Body Co. is the new name of the Porter Mfg. Co., Ann Arbor, Mich. The company is extending its business to include the manufacture of truck and trailer bodies on a broader scale.

McMullen Represents Timken Bearings—George C. McMullen, formerly assistant plant manager of the metal products plant of the Timken-Detroit Axle Co., Detroit, now is representing the Timken Roller Bearing Co., with headquarters in San Gabriel, Cal.

Adams Is Willard District Manager—H. M. Adams has been appointed eastern district manager of the Willard Storage Battery Co., Cleveland, Ohio, to succeed A. W. Sayer, who has been recalled to the main office. Mr. Adams will have headquarters in New York.

Guaranty Securities Changes Name—The Guaranty Securities Corp. has changed its title to that of Continental Guaranty Corp., effective April 15. The action involves no change of ownership or management. The banking house will continue to extend the same kind of accommodation to motor car and truck dealers.

Avery Dealer Holds School—The Shannahan & Wrightson Hardware Co., Easton, Pa., distributor of Avery tractors, held a service school two days recently. With the aid of lecturers and motion pictures, farmers and dealers were familiarized with the care, repair and maintenance of Avery tractors. An afternoon was devoted to power-driven farm implements.

McNulty Becomes Truck Distributer—Charles L. McNulty has resigned as district sales manager of the Saxon Motor Car Corp. and has joined the Oklahoma Truck Corp., Oklahoma City, Okla., as secretary, treasurer and general manager. This is a new organization which will distribute Bethlehem trucks throughout the state of Oklahoma and in the Wichita, Kan., territory, with the branch house at Wichita.

Automobile Mfg. Co. Organized—A new company to be known as the Automotive Mfg. Co. has been incorporated at Detroit with a capital of \$125,000. It will manufacture universal joints, pressed steel parts, steering links and ball and socket joints. Eventually, it is expected that 90 per cent of the production will be government work. The company now occupies a temporary building. After the completion of its new plant July 1 it will move into a one-story brick structure 136 by 180 ft. The officers of

Coming Motor Events

SHOWS

- April 9-13—Stockton, Cal.
- April 9-13—Parsons, Kan.
- April 16-20—Savannah, Ga.
- April 16-20—Deadwood, S. D.

the company are: I. D. Shaw, president; George Fred Buechler, vice-president; Joseph H. Smith, secretary.

Myers Resigns from Doble—Thomas P. Myers, who for the last year and a half has been vice-president and sales director of the General Engineering Co. and the Doble-Detroit Steam Motors Co., Detroit, has resigned and probably will go into Governmental work.

EssenKay in Larger Quarters—The EssenKay Products Co., Chicago, will occupy a five-story building after May 1, larger quarters having become necessary. The mechanical engineering department of the concern has designed special machinery which now is being installed in the new building.

Dodge Buys Wilt Plant—John F. Dodge, of Dodge Brothers, has purchased the site and factory building of the Wilt Engineering Co. The price paid is placed at \$115,000. Whether the property was bought for use of the Dodge Brothers plant has not been ascertained, but it is presumed that such is the case. A building of brick and glass construction occupies the 5½-acre site and is 50 by 275, one story in height. The property is just across from the main plant of Dodge Brothers.

Landman Heads Maxwell Distributors—Charles P. Landman is now the president of the Maxwell Distributors' Association of the Central East. This association is an organization consisting of the big Maxwell distributors in the district that includes Western New York, Western Pennsylvania, Virginia, West Virginia, Michigan, Ohio and Indiana, known as the Cleveland zone. The object of the organization is to work out ideas and co-operative features for the betterment of the Maxwell business in its district and to

work in the closest harmony with the distributors, dealers and factory men. It is probable that Toledo will be the headquarters for the association.

Dunston Now with Crown—W. E. Dunston, formerly chief engineer of the Standard Parts Co., Cleveland, Ohio, is now with the Crown Hardware Mfg. Co., Dayton, Ohio.

Michigan Stamping Completes Warehouse—**Wilson Is Promoted by Packard**—John D. Wilson has been appointed assistant chief engineer of the carriage division of the Packard Motor Car Co., Detroit, succeeding G. H. Brodie, who has been transferred to the aircraft engineering staff. Mr. Wilson has been assistant carriage chassis engineer.

La Salle County Organizes—About all the leading dealers and garagemen in La Salle County, Illinois, have organized the Garage Owners & Automobile Dealers' Association of La Salle County. They have affiliated with the Garage Owners & Automobile Dealers' Association of Illinois. The officers are: President, Matt Knauf, Peru; secretary-treasurer, Will Kinder, La Salle.

The Michigan Stamping Co. has just completed a warehouse with approximately 6000 sq. ft. and contemplates the erection of another building for production purposes unless it moves into its building now occupied by the office department of the Saxon, whose lease expires in June. The Saxon expects to vacate this building about this time and remove its office to the factory building on Beaufait avenue.

Texas Dealers in Annual Convention—The Texas Automobile Dealers' Association held its second annual convention at San Antonio recently. Two hundred dealers now belong to the association. Officers for the coming year are: President, F. A. Weinrich, San Antonio; vice-presidents, Roy Munger, Dallas, H. G. Bryant, San Antonio, and George Conant, Houston; treasurer, W. F. Rose, Dallas.

Derby Makes Weekly Driveaways—The Derby Motor Truck Co. has completed three new buildings to be used for assembling. Driveaways from the plant are very popular. A fleet of trucks leaves the factory every Wednesday, goes down into Ohio and picks up full capacity loads and then makes an easy trip to New York, taking five days for the entire run. From four drivers in the first fleet the number has increased to ten. If competent drivers can be obtained, this number will be increased.



ADD IDEAS FOR DRIVEAWAYS—This is the way in which two Wichita trucks are driven overland by a driver who usually drives only one. Kind of "you be the eyes and I'll be the ears" affair

From the Four Winds



No Ontario Licenses for Enemy—The Province of Ontario government has passed an order-in-council providing that alien enemies shall not be granted licenses for motor cars or motorcycles this year.

Markers for Star Highway—A contract has been let to mark the Star highway from Dodge City, Kan., to Wichita Falls, Tex. This will give a marked highway from Bismarck, N. D., to the Gulf via the Star highway from Bismarck to Dallas and Fort Worth, Tex., then the Colorado-to-the-Gulf highway to the Gulf points. This work is to be completed before the Star Highway Association convention at Frederick, Okla., June 5-6.

Arizona Club Is Launched—The Automobile Club of Arizona has been organized and will issue a weekly report on the condition of highways in different parts of Arizona, encourage uniformity of traffic regulations and endeavor to unite for co-operation purposes the car owners of Arizona. Tours to points of historic interest will be compiled by the club, which plans to enroll 1000 members this year. The officers of the organization are Carl H. Anderson, president; F. H. Redewill and J. C. Adams, vice presidents; G. W. Quinn, secretary and treasurer.

Michigan Pike Tour Planned—The third annual tour of the East Michigan Pike will be held in July. The tour is to be extended this year to include that section of the Dixie highway and East Michigan pike between the Straits of Mackinac and St. Mary's river and connecting St. Ignace and Sault Ste. Marie. There has been a great deal of improvement in the East Michigan pike in the last year, and more work is planned this year, despite the fact that the war is impeding the progress of road building in some communities. While no date has been definitely decided on, it is likely the tour will start from Detroit the

Keep the Roads Open

FOR the last six years William A. Merigold, Jr., Green Lake, Wis., has kept a section of road 4 miles long open without any outside assistance. When the farmers see his men appear for work, Mr. Merigold says, they promptly disappear until the road has been cleared, when they hitch up every team they have and do their hauling.

"Some time ago," says Mr. Merigold, "all the states had legislation pending to increase the width of sleigh and bob runners to standard width, but I have not heard anything lately about it and no sign of any wide runners. I should think that all the motor publications would insist that these laws be put through and enforced quickly, for if these runners were the same width as a car or

second week in July. The main party will go via Pontiac and Flint, while one group of boosters will leave a day earlier and go to Port Huron, Harbor Beach and around the Thumb, meeting the others at Saginaw or Bay City.

Would Make Through Camp Road—County commissioners will go before the Ohio state highway commission to ask \$75,000, half of a sum needed to repair 4 miles of the Chillicothe pike and a mile of the National highway. The county will put up the other \$75,000. If the Chillicothe pike is repaired, there will be practically a through road from Columbus to Camp Sherman. The portion to be repaired extends 2 miles north of Shaderville to the county line. Repair of the pike has been advocated and urged by many civic bodies and individuals.

Goodyear Gardens Are Plotted—The Goodyear Tire & Rubber Co., Akron, Ohio, has about 40 acres of land available for gardens for employees now and has offered to permit the cultivation of all ground the company owns not needed immediately for other purposes. The 40-acre tract has been divided

truck it would be a simple matter for them to keep going and it would do away with the shoveling of roads when the snow is between 12 and 18 in. deep. Using a plow in front of a truck is all right at the first of a season, but when the cuts begin to have snow banks from 4 to 7 ft. deep there is no place to push the snow. A small rotary mounted on the rear end of a truck and operated from a counter-shaft so that the truck could be backed into the drift would solve our greatest need. In operating a rotary it is not necessary to go fast and the high ratio on reverse would enable the truck to keep in gear without constantly releasing the clutch. Let's all get together on this snow question and keep our roads open."

into plots 50 by 100 ft. Plowing and harrowing will be at the expense of the company, and its labor department will distribute prizes to those who work their plots most successfully.

Truck and Trailer Move Stock—Instead of depending upon a railroad to move a stock of store fixtures from Cleveland to Toledo, Ohio, a shoe dealer who purchased the stock called in the services of a Packard truck and a Troy trailer. This permitted him to pack up the load in Cleveland Saturday, arrange his stock in Toledo Sunday and be ready for business Monday. Due to the fragile contents of the load travel was slower and 15 hrs. were consumed in making the trip of 126 miles.

Northville, Mich., Forms Club—The Northville Automobile Club has been organized by car owners of Northville, Mich., and vicinity. The officers are: C. C. Yerkes, president; T. G. Richardson, vice-president; L. A. Babitt, treasurer; F. L. Neal, secretary. The club plans to affiliate with the American Automobile Association, of which the Detroit club is the Michigan representative. It has fifty charter members.



ONE AIRPLANE FROM ANOTHER—The photograph of "260" was taken from another plane at the same altitude, 2,000 ft. The two were at an aviation camp in this country